NEC

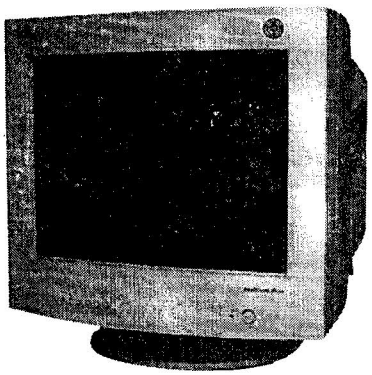
MODELS JC-2148UMW (A)/(B)/(R)/(AS)

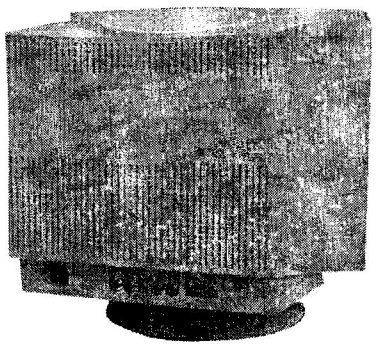
COLOR MONITOR **MultiSync® P1250+**

SERVICE MANUAL

PART NO. 599910459

Better Service
Better Reputation
Better Profit





NEC Corporation
TOKYO, JAPAN

⚠ WARNING

The SERVICE PERSONNEL should have the appropriate technical training, knowledge and experience necessary to:

- Be familiar with specialized test equipment, and
- Be careful to follow all safety procedures associated with high voltage CRT circuit designs to minimize danger to themselves and their coworkers.

To avoid electrical shocks, this equipment should be used with an appropriate power code and be connected only to a properly grounded AC outlet.

This equipment utilized a micro-gap power switch. Turn off the set by first pushing the front panel power switch. Next, remove the power cord from the AC outlet.

To prevent fire or shock hazards, do not expose this unit to rain or moisture.

This symbol warns the personnel that un-insulated voltage within the unit may have sufficient magnitude to cause electric shock.

This symbol alerts the personnel that important literature concerning the operation and maintenance of this unit has been included.
Therefore, it should be read carefully in order to avoid any problems.

⚠ PRODUCT SAFETY CAUTION

1. When parts replacement is required for servicing, always use the manufacturer's specified replacement.
2. Comply with all caution and safety-related notes on the product display chassis and picture tube.
3. When replacing the component, always be certain that all the components are put back in the place.
4. When servicing display monitor unit, it is required that the provided lead dress is used in the high voltage circuit area.
5. It is also recommended that shatter proof goggles are worn, when removing installing and handling the picture tube. People not equipped with the proper precautionary measures mentioned should keep the picture tube away from body while handling.
6. As for a connector, pick and extract housing with fingers properly since a disconnection and improper contacts may occur, when wires of the connector are led.
7. Use a proper screwdriver. If you use screwdriver that does not fit, you may damage the screws.
8. X-radiation precaution

   This product contains critical electrical and mechanical parts essential for X-ray protection.

   Normal anode voltage is 27.0 kV at zero beam picture tube current under AC 100-120V/220-240V input, and anode voltage must not exceed the voltages shown below under any operation condition.

   To measure anode voltage set brightness for very dim picture, and use a high impedance volt meter between chassis and anode lead and measure high voltage.

   If high voltage exceeds the specifications on the chassis schematic diagram, take the necessary corrective action.

Table MAXIMUM ANODE VOLTAGE

beam current	at 0 mA	at 0.7 mA	at 1.4 mA
A/B/R/AS	34.1 kV	32.9 kV	32.5 kV

9. When you degauss the set with an external degaussing coil, you must keep strictly item " ※Notes about degaussing method " of ADJUSTMENT PROCEDURES.

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SPECIFICATIONS

Monitor Specifications	**MultiSync ® P1250+ ™ Monitor**	**Notes**
Picture Tube Diagonal: Viewable Image Size: Radius:	53.0 cm / 21.0 inch 49.8 cm / 19.6 inch 1850 mm	90° deflection, 0.28 mm grille pitch Medium-Short persistence phosphor, aperture grille CRT, multi-layered, anti-static screen coating,dark-tint screen ,and OptiClear screen surface.
Input Signal Video: Sync:	ANALOG 0.7 Vp-p/75 Ohms Separate sync. TTL Level Horizontal sync. Positive/Negative Vertical sync. Positive/Negative Composite sync. (Positive/Negative) (TTL Level)	
Display Colors Analog input:	Unlimited number of Colors	Depends on display card used.
Synchronization Horizontal: Range Vertical:	31 kHz to 110 kHz 55 Hz to 160 Hz	Automatically Automatically
Resolutions Recommended Resolution based on horizontal and vertical frequencies only	640 x 480 @ 60 to 160 Hz 800 x 600 @ 55 to 160 Hz 832 x 624 @ 55 to 160 Hz 1024 x 768 @ 55 to 132 Hz 1152 x 870 @ 55 to 118 Hz 1280 x 1024 @ 55 to 101 Hz 1600 x 1200 @ 55 to 87 Hz 1800 x 1440 @ 55 to 73 Hz	Some systems may not support all modes listed.
Active Display Area Horizontal: (Factory Setting) Vertical:	384 mm/15.1 inches 288 mm/11.3 inches	Dependent upon signal timing used, and does not include border area.
Active Display Area (Full Scan)	398 mm/15.7 inches 299 mm/11.8 inches	Dependent upon signal timing used, and does not include border area.
Power Supply	AC 100 – 120 V / 220 - 240 V@, 50/60 Hz	
Current Rating	2.5A @ 100 – 120 V / 1.1A@ 220-240 V	
Dimensions	509 mm (W) x 519 mm (H) x 525 mm (D) 20.0 inches (W) x 20.4 inches (H) x 20.7 inches (D)	
Weight	34.3 kg 75.6 lbs	
Environmental Considerations Operating Temperature: Humidity: Feet: Storage Temperature: Humidity: Feet:	 10° C to + 35° C 30% to 80% 0 to 10,000 Feet -20° C to + 60° C 10% to 90% 0 to 45,000 Feet	

NOTE: Technical specifications are subject to change without notice.

CONTROLS

OSM (ON-Screen Manager) control buttons on the front of the monitor function as follows:

	Main Menu	**Sub-Menu**
EXIT	Exits the OSM Controls.	Exits to the OSM main menu.
CONTROL ▲/▼	Moves the highlighted area up/down to select one of the controls.	Moves the highlighted area up/down to select one of the controls.
CONTROL −/+	Moves the highlighted area left/right direction one of the controls.	Moves the bar in the - or + direction to decrease or increase the adjustment.
PROCEED	Has no function.	Only executes control or enters sub, sub-menu.
RESET	Resets all the controls within the highlighted menu to the factory setting.	Resets the highlighted control to the factory setting.

NOTE : When **RESET** is pressed in the main and sub-menu, a warning window will appear allowing you to cancel the reset function.

When OSM controls are activated, icons are displayed at the top of the menu.

If an arrow (→) is displayed in a sub-menu, it indicates further choices are available.

To enter a sub, sub-menu, press PROCEED.

Brightness/Contrast Controls

Brightness : Adjusts the overall image and background screen brightness.

Contrast : Adjusts the image brightness in relation to the background.

Degauss : Eliminates the buildup of stray magnetic fields which alter the correct scan of the electron beams and affect the purity of the screen colors, focus, and convergence. When activated, your screen image will jump and waver a bit as the screen is demagnetized.

Caution : Please allow a minimum of 20 minutes to elapse between uses of the Degauss Control.

Size and Position Controls

Left/Right : Moves the image horizontally (left or right).

Down/Up : Moves the image vertically (up or down).

Narrow/Wide : Decreases or increases the horizontal size of the image.

Short/Tall : Decreases or increases the vertical size of the image.

Color Control / AccuColor® Control System

Color Presets 1 through 5 selects the desired color setting. The bar is replaced by the color setting choice from 1 to 5. Each color setting is adjusted at the factory to the stated Kelvin. If a setting is adjusted, the name of the setting will change from Kelvin to Custom.

Red, Green, Blue : NEC's AccuColor Control System decreases or increases the monitor's red, green, or blue color guns depending upon which is selected. The change in color will appear on screen and the direction (decrease or increase) will be shown by the bars.

Geometry Controls

Geometry Controls Menu

The **Geometry** controls allow you to adjust the curvature or angle of the sides of your display.

Sides In/Out (pincushion): Decreases or increases the curvature of the sides either inward or outward.

Sides Left/Right (pincushion balance): Decreases or increases the curvature of the sides either to the left or right.

Sides Tilt (parallelogram) : Decreases or increases the tilt of the sides either to the left or right.

Sides Align (trapezoidal) : Decreases or increases the bottom of the screen to be the same as the top.

Rotate (raster rotation) : Rotates the entire display clockwise or counterclockwise.

Tools 1

Moiré Canceler: Moiré is a wavy pattern which can sometimes appear on the screen. The pattern is repetitive and superimposed as rippled images. When running certain applications, the wavy pattern is more evident than in others. To reduce moiré, adjust the ON/Level by using the –/+ CONTROL buttons.

Linearity: This selection allows you to adjust the spacing of the area on the screen. The purpose of this control is to ensure that a one-inch circle is a true one-inch circle wherever it is on the screen.

The best way to determine the vertical linearity is as follows:

- Draw equally spaced horizontal lines using a drawing application that has a ruler.
- Use the Vertical Balance control to adjust the lines near the top and bottom of your screen.
- Use the Vertical control to adjust the spacing between the lines near the center and top of your screen.

Convergence: Aligns all three colors(R,G,B) to form a single color(white). The purpose of this control is to ensure that a white line drawn on the screen is as crisp and clear as possible.

- Use the Horizontal control to adjust the alignment of the white lines in the up/down direction.
- Use the Vertical control to adjust the alignment of the white lines in the left/right direction.

GlobalSync® Control: Eliminates picture impurities that may result from the earth's magnetic field. Adjusting the control bar will change the display's rotation in a clockwise or counterclockwise direction.

Note: NEC recommends that you perform GlobalSync correction while running a typical application such as a spreadsheet or text document.

Sharpness: Allows you to adjust the clarity of the image, based on the quality of the signal received from the cpmputer.

- Use a full text document to make this adjustment.
- Cycle through the four sharpness settings and select the one that provides the sharpness focus and contrast of the text.

EdgeLock™ Control: Operating your monitor at a non-standard timing may cause images to appear darker than normal or have color distortion. Use of the EdgeLock control will adjust images to their normal state.

Factory Preset: Selecting Factory Preset allows you a reset most OSM™ control settings back to the factory settings. A warning statement will appear to confirm that you do want to reset ALL settings. Individual settings can be reset by highlighting the control to be reset and pressing the **RESET** button.

Tools 2

Language: OSM controls menus are available in seven languages.

OSM Position: You can choose where you would like the OSM controls menu to appear on your screen. Selecting OSM Position allows you to manually adjust the OSM controls menu left, right, up or down.

OSM Turn Off: The OSM controls menu will stay on as long as it is in use. In the OSM Turn Off sub-menu, you can select how long the monitor waits after the last touch of a button for the OSM controls menu to disappear. The preset choices are 10, 20, 30, 60 and 120 seconds.

OSM Lock Out: This control completely locks out access to all OSM controls functions except Brightness and Contrast. When attempting to activate OSM controls while in the lock out mode, a screen will appear indicating that OSM controls are locked out. To activate the OSM Lock Out function, press **PROCEED**, then press ▲ and hold down simultaneously. To deactivate the OSM Lock Out, press **PROCEED**, then press ▲ and hold down simultaneously.

IPM™ System Off Mode: Enable: The IPM System works normally and all stages of energy savings are utilized.

Disable: The Off Mode of the IPM System is not used.

NOTE: For standard systems and graphics boards, keep the factory setting at ENABLE.

Refresh Notifier: A message will advise you if the refresh rate of the signal being applied to the monitor by the computer is too low. For further information, please refer to your display card or system manual.

Information

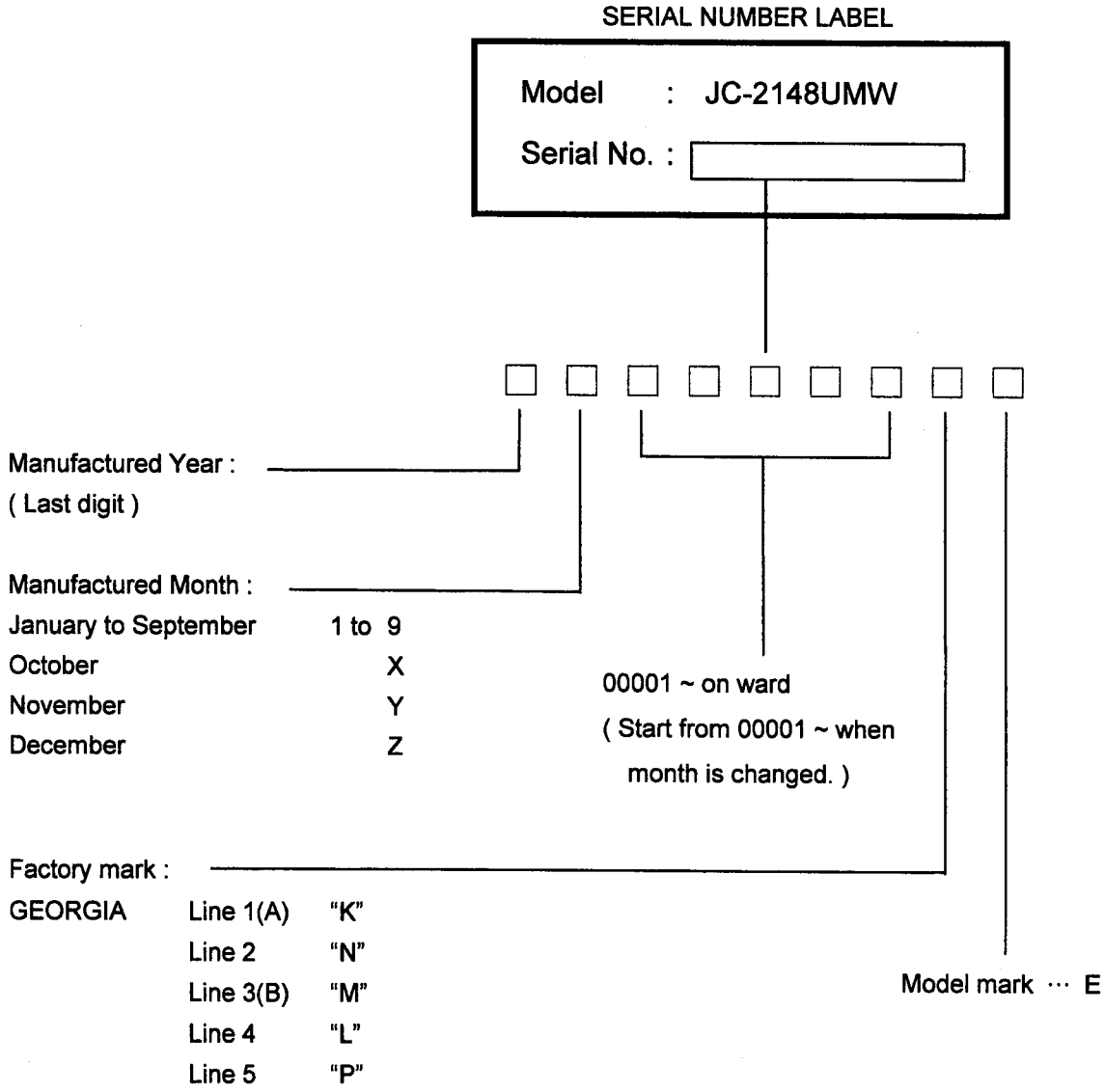
Display Mode: Indicates the current mode and frequency setting of the monitor.

Fitness Tips: The fitness Tips provide you with helpful reminders to periodically rest your eyes. You may select how frequently the remainders are displayed based upon your individual needs. Select an interval from 15,30,45,60,90 or 120 minutes for the tips to appear. When the tips appear, follow the advice of the tips and press EXIT to clear.

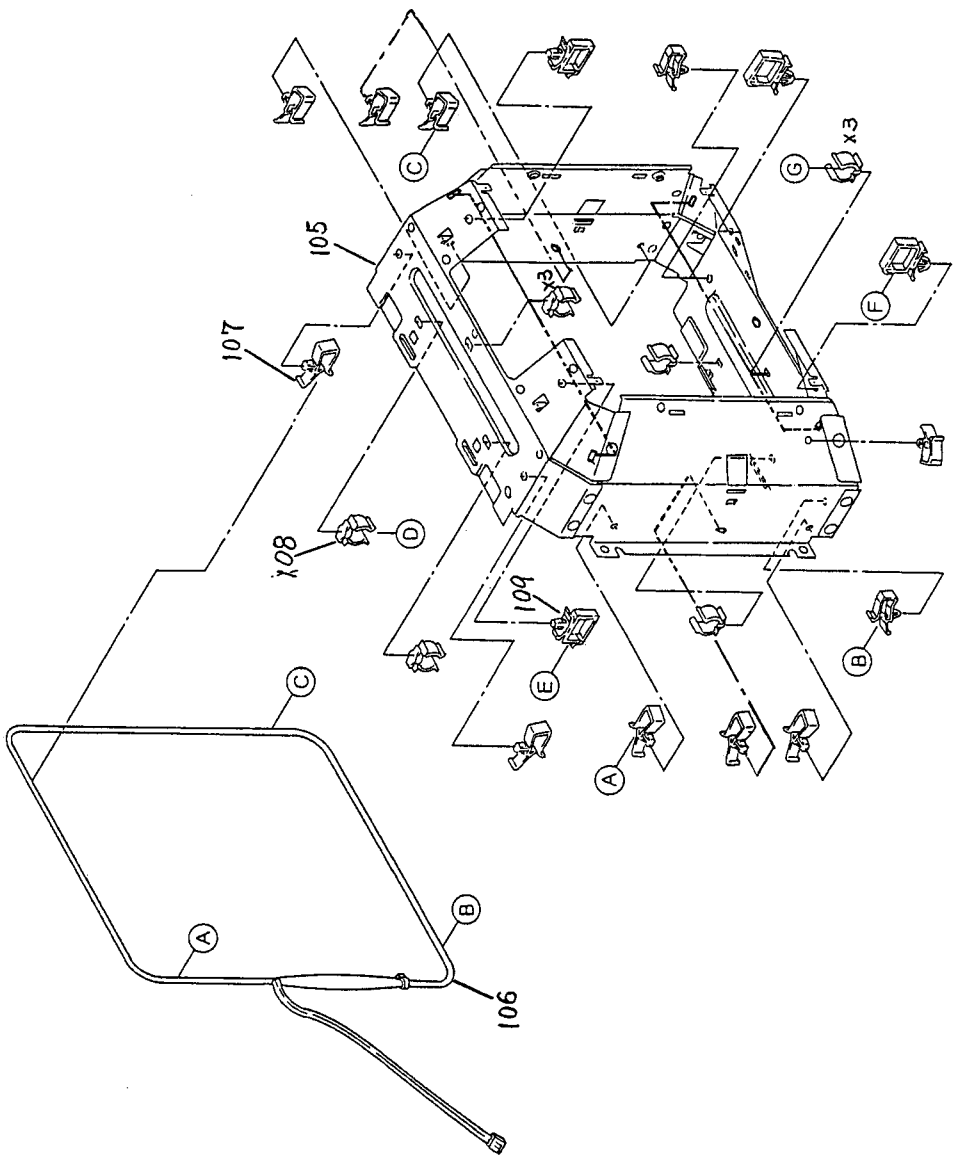
Monitor Info: Indicates the model and serial numbers of your monitor.

SERIAL NUMBER INFORMATION

Refer to the serial number information shown below.

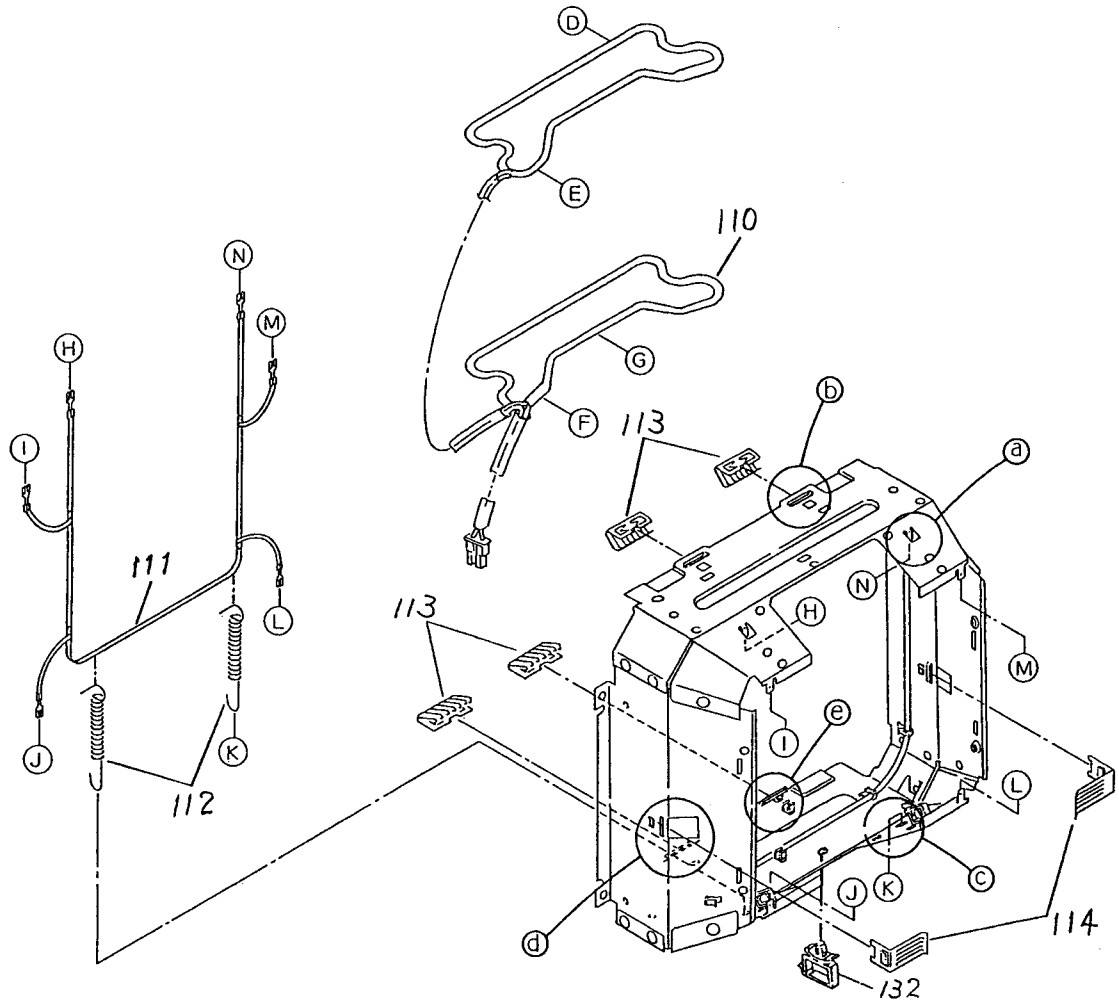


ASSEMBLY

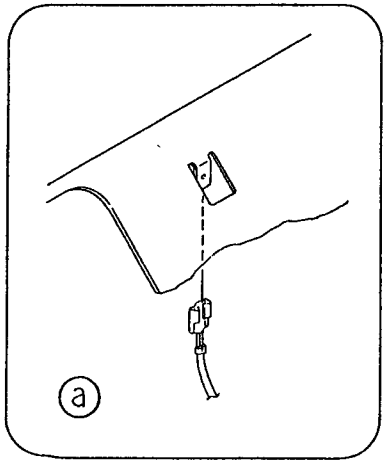


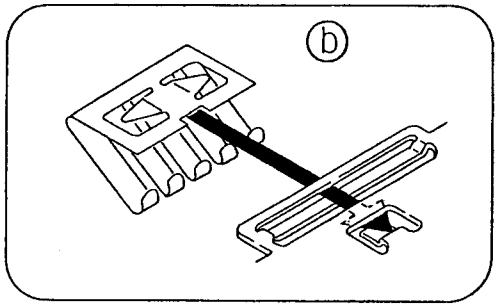
REMARK	SYMBOL	
Turn the CLAMPER, WIRE(D.G.COIL) 90° after inserting. (10points)	105 108	
Inset clamper wire. No.107 11points No.109 4points	107 109	
Clamp the COIL (85T,63H) with CLAMPER, WIRE. (10points)	106 107	

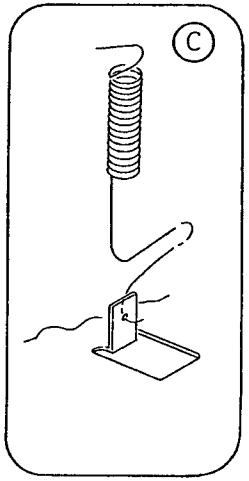
REMARK	SYMBOL
Clamp the DEGAUSSING COIL with clamper, wire. No.108 10points No.109 4points	108 109 110

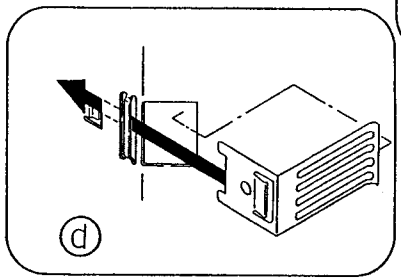


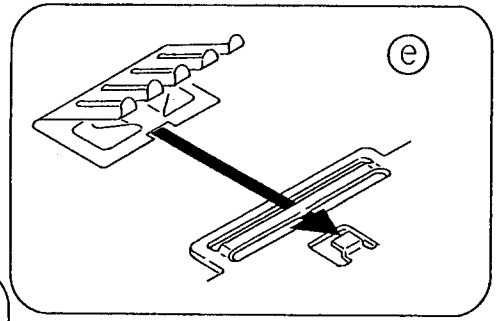
REMARK	SYMBOL



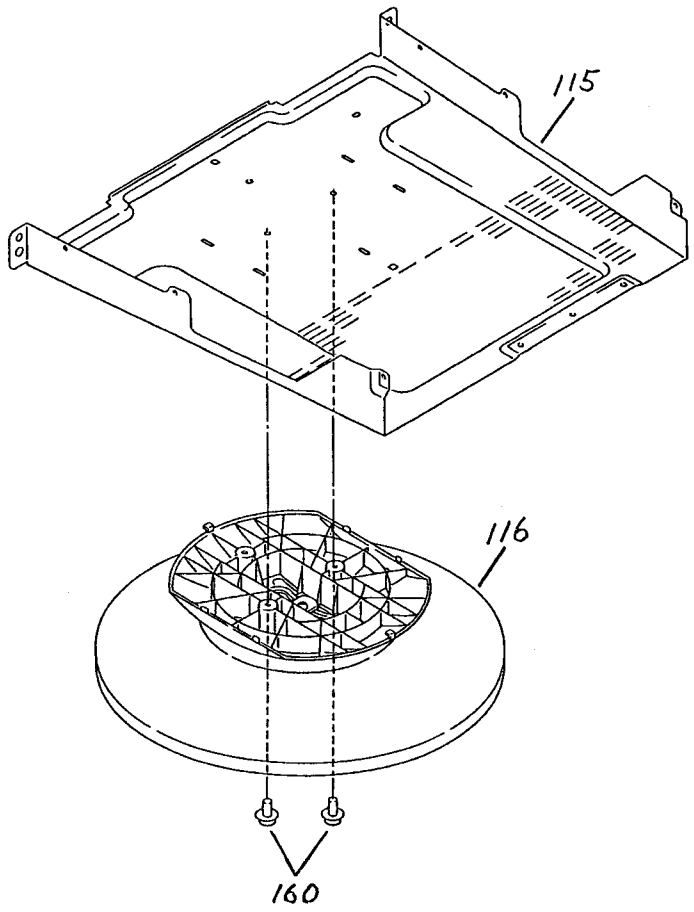


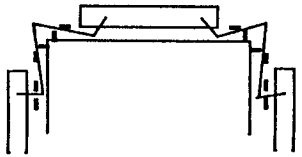
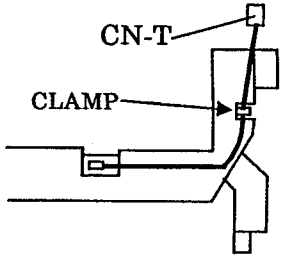


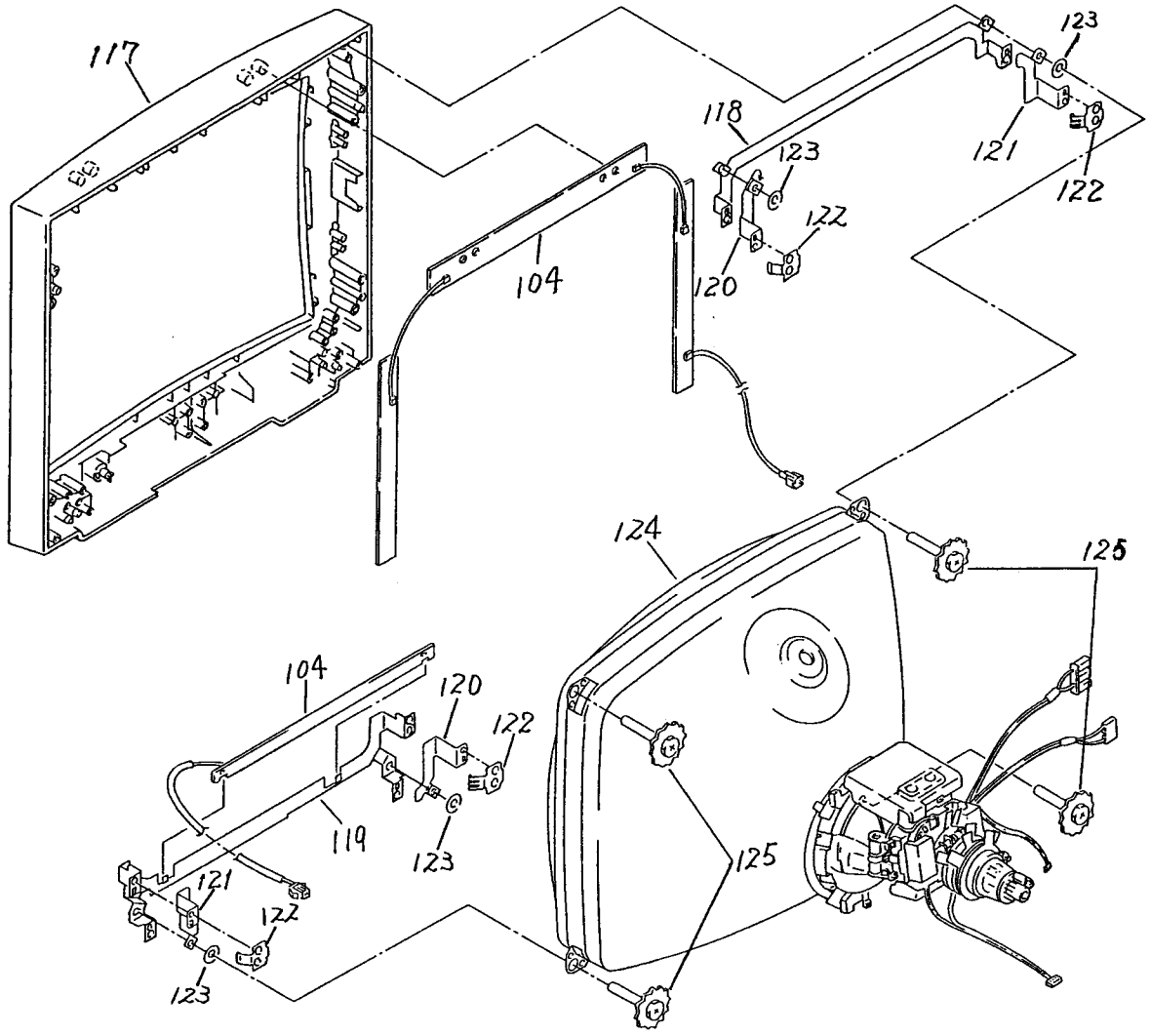




REMARK	SYMBOL
Mount REVOLVING STAND to the CHASSIS BASE.	115 116 160



REMARK	SYMBOL
Dress the CN-TC on the CABINET FRONT as per sketch. 	117 104
Dress the CN-T on the PLATE,SHIELDING (SSI.B) as per sketch. 	119 104



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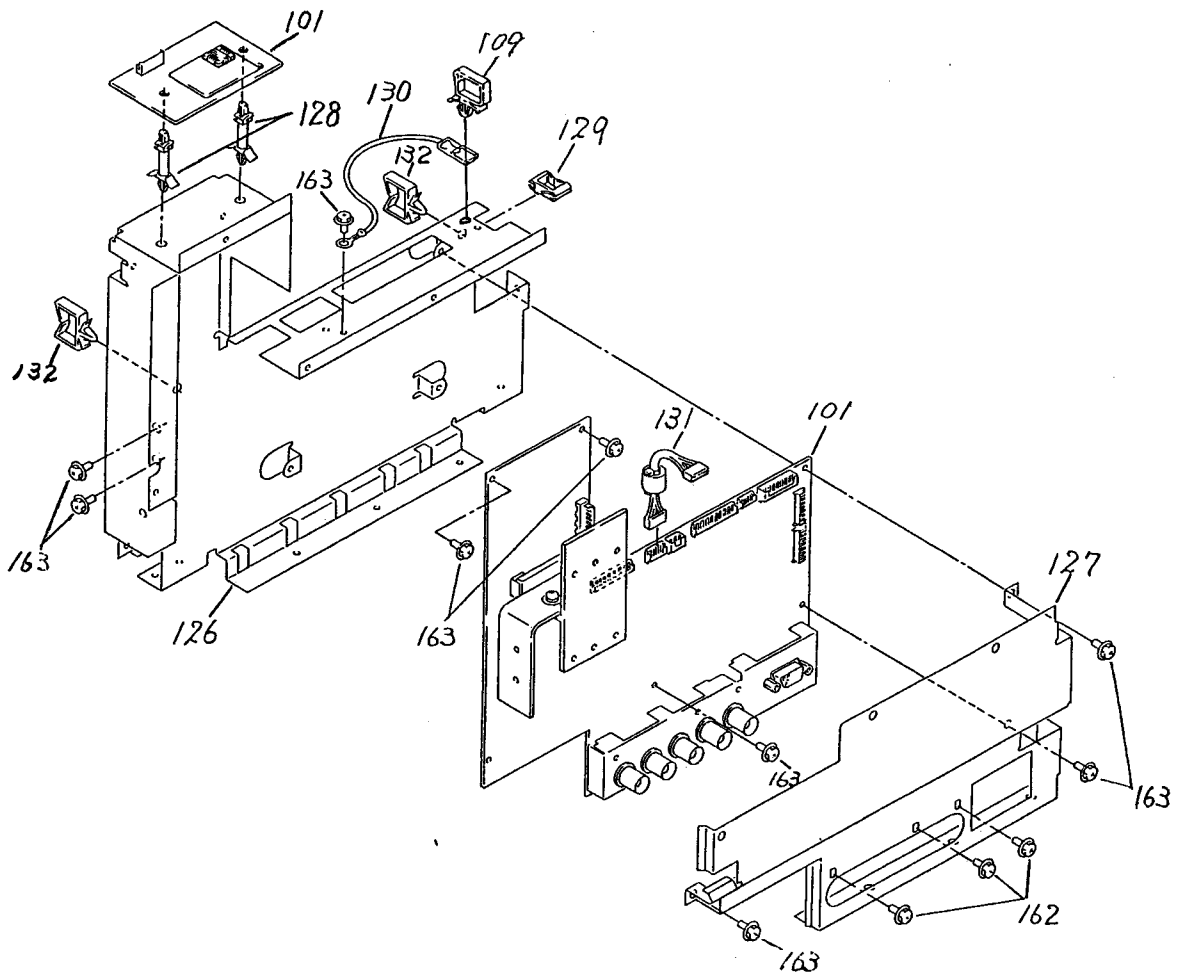
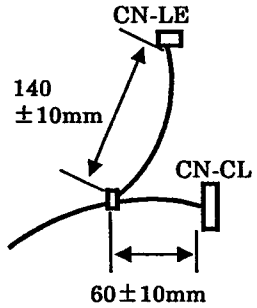
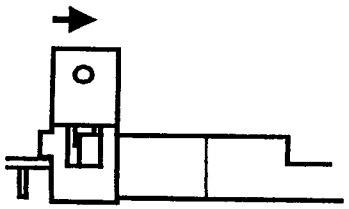
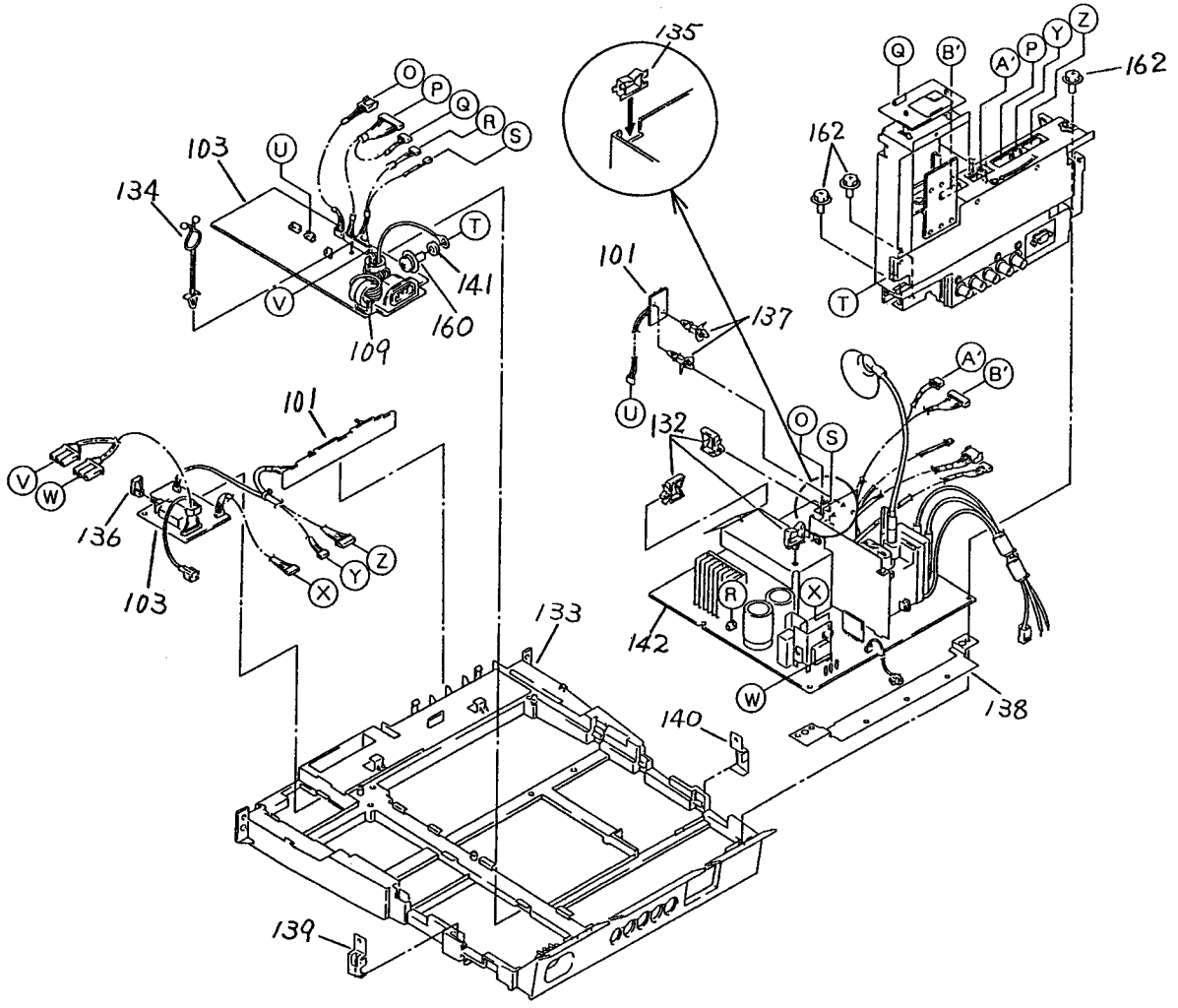
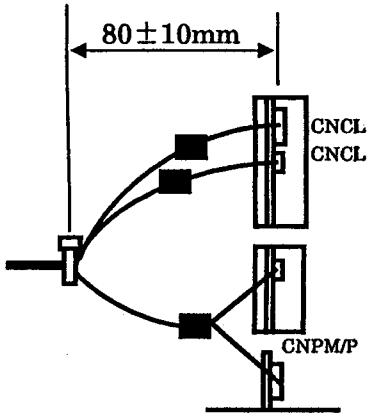
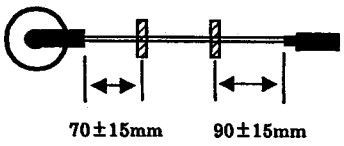
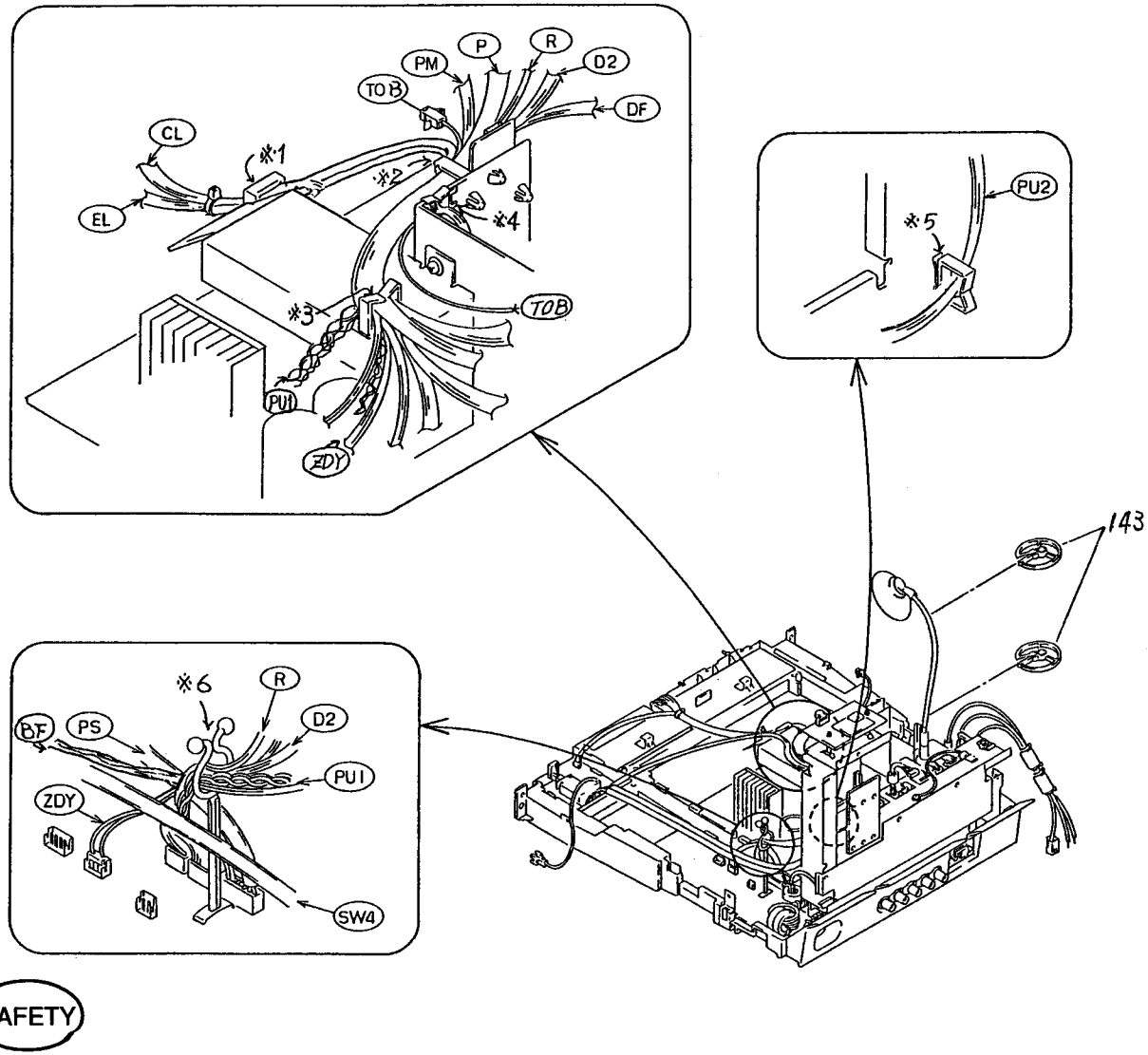
		

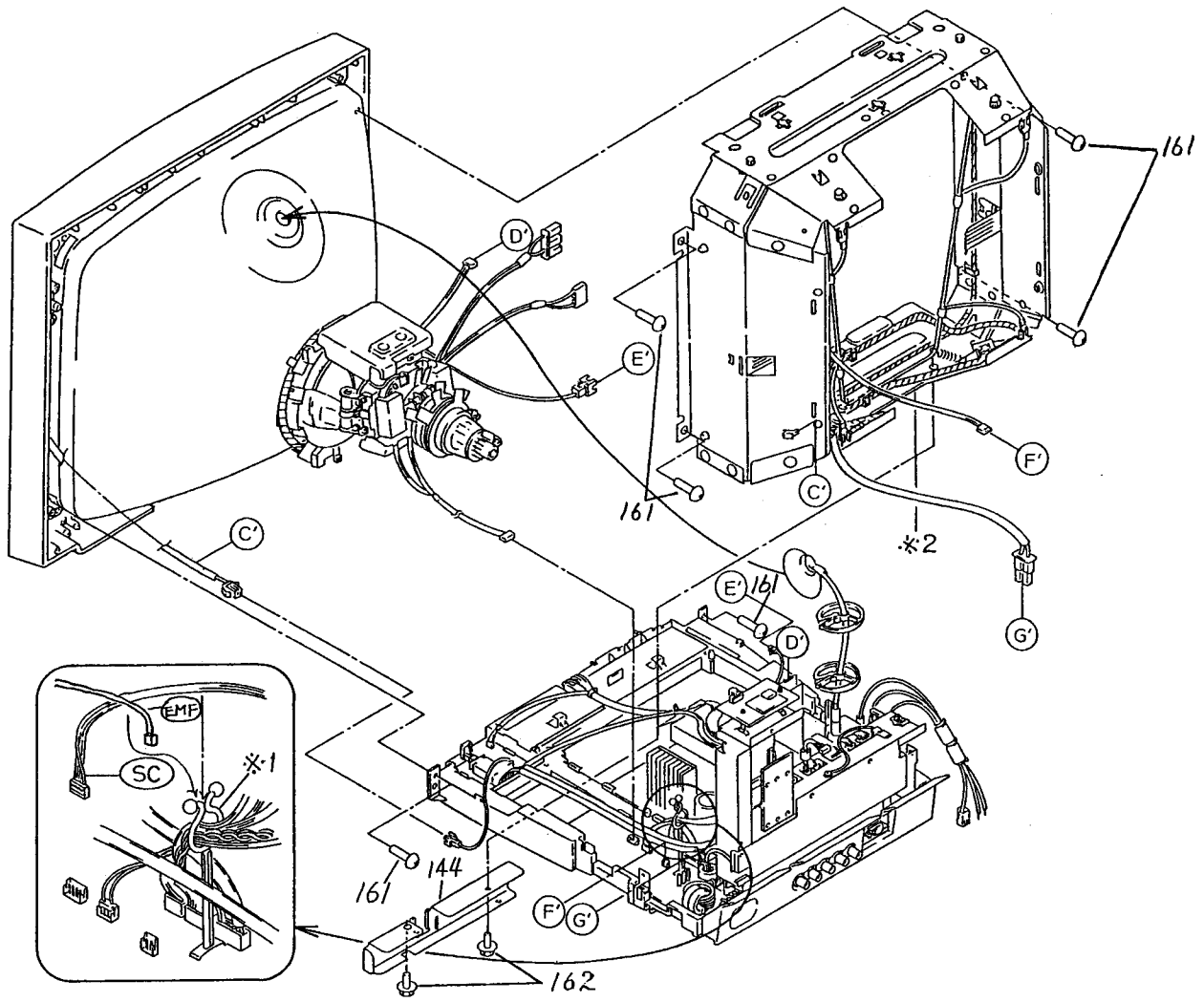
REMARK	SYMBOL
Insert the CLAMPER WIRE(No.109) to the COMP PWB. Clamp the CN-AC1 with CLAMPER WIRE (No.109).	109
Tie up CN-LE and CN-CL as per sketch.  	155
Slide the PLATE, SHIELDING(BASE,R) and (BASE,L) after attach. Xe) (BASE,L) 	133 139 140



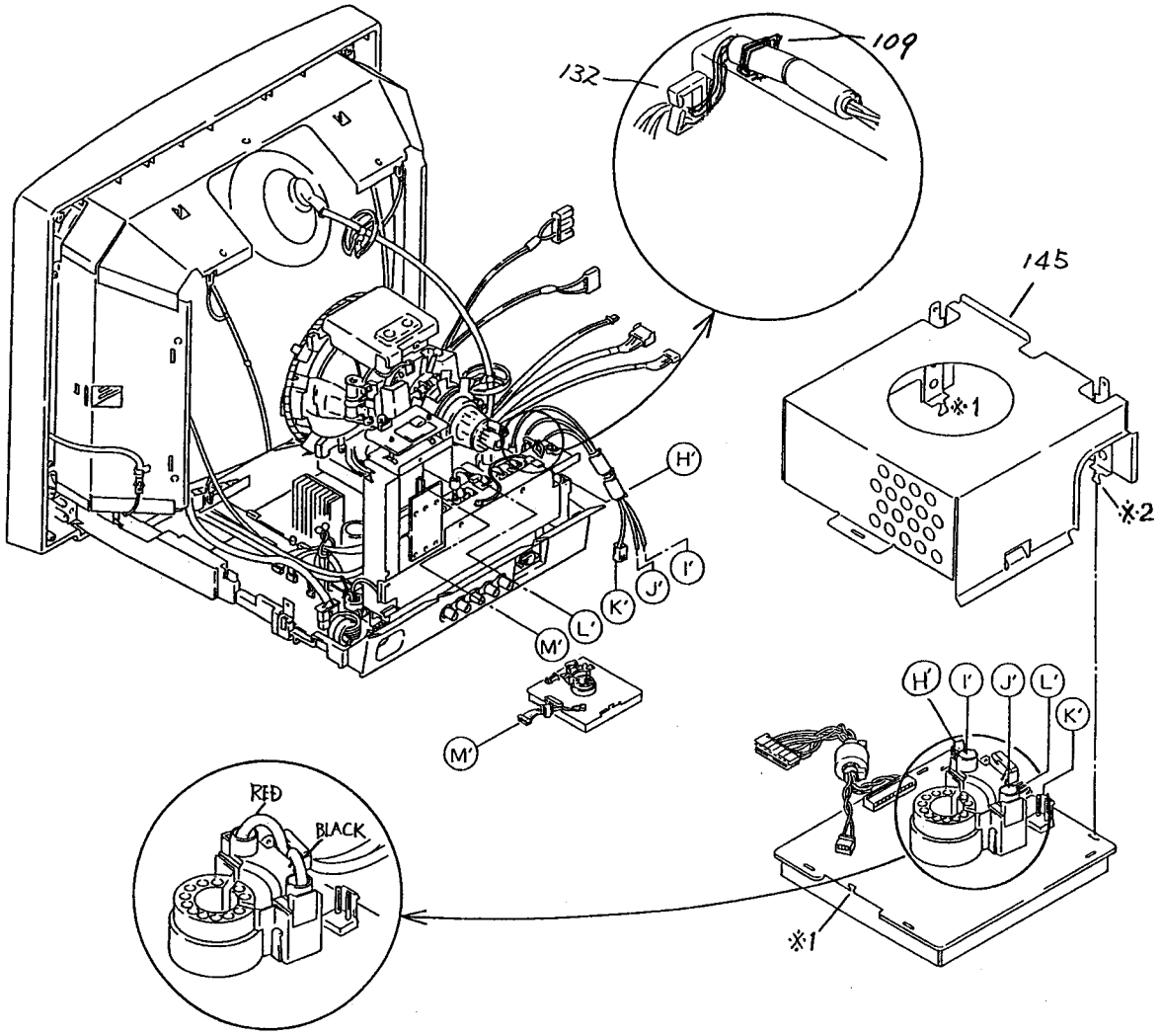
REMARK	SYMBOL
Clamp the wires. ※1 CN-CL,EL ※2 CN-TOB,PM,P,R,D2,DF, ZDY,CL,EL ※3 CN-PM,P,R,D2,PU1,BF ZDY,CL,EL ※4 CN-DF ※5 CN-PU2 ※6 CN-PU1,R,D2,ZDY,BF	
Tie up the CN-CL,CN-LE and CN-PM/P as per sketch.  	155
Mount ANODE CLAMPER.  	143

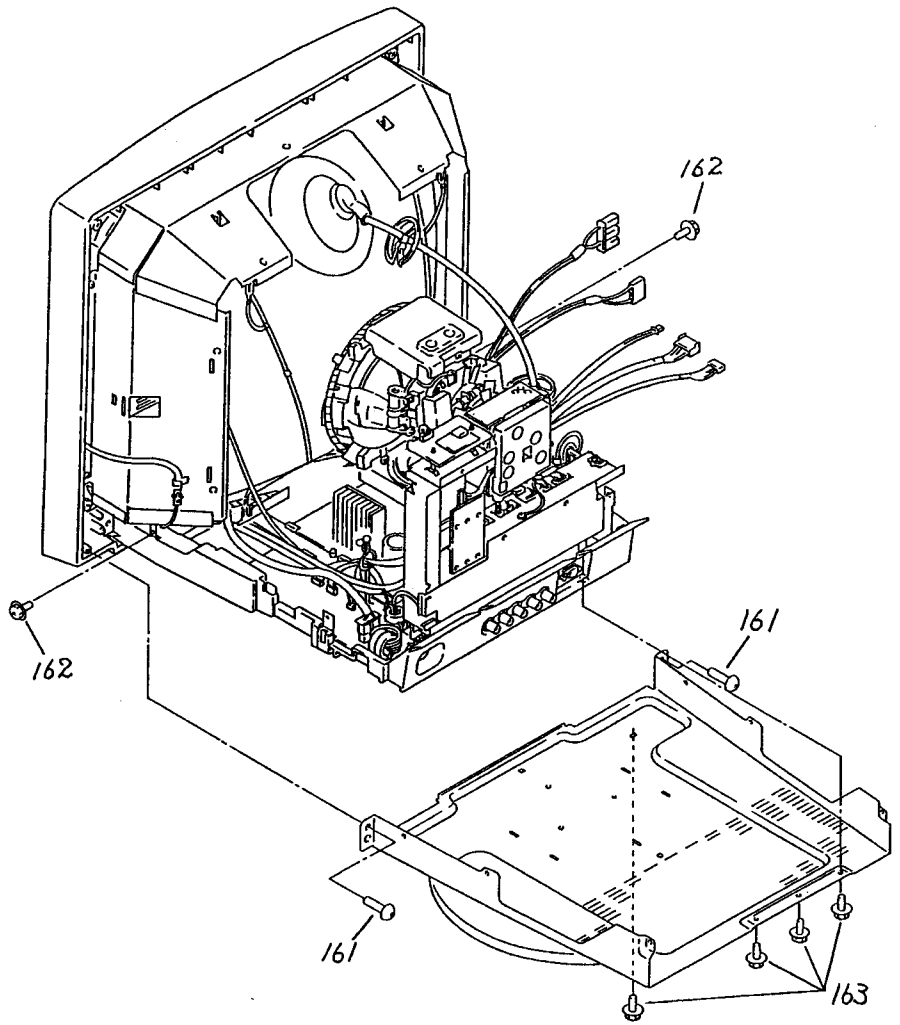


REMARK	SYMBOL
CN-T cloth line of outside of PLATE, SHIELDING(CRT)ASSY.	C'
Clamp the CN-SC and CN-EMF with clamper wire.(※1)	134
Clamp the CN-LE and CN-CL. (Bottom the PLATE SHIELDING (CRT) ASSY)	132 ※2

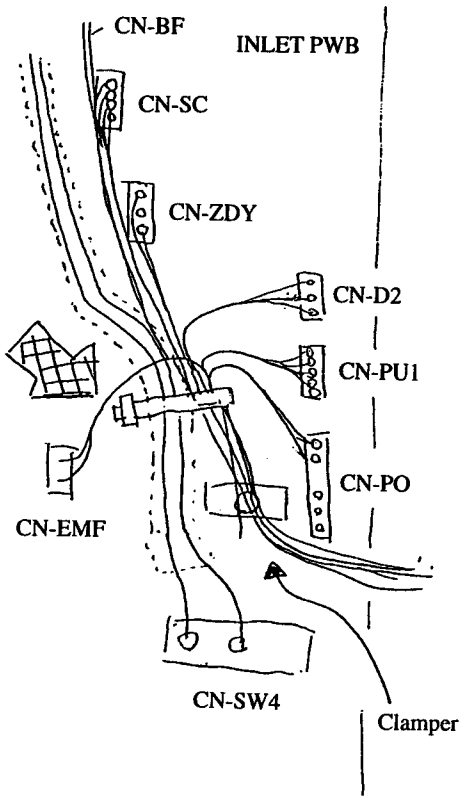


REMARK	SYMBOL
※1 Turn the lead after insert. 45° **(2 Points)**	**101B** **145**
※2 Solder the read on the CRT PWB (copper side) after insert.	**145**
Screen read pushes it in PLATE,SHIELDING (CRT,F)ASSY. ※ Countermeasure for sharp edge.	

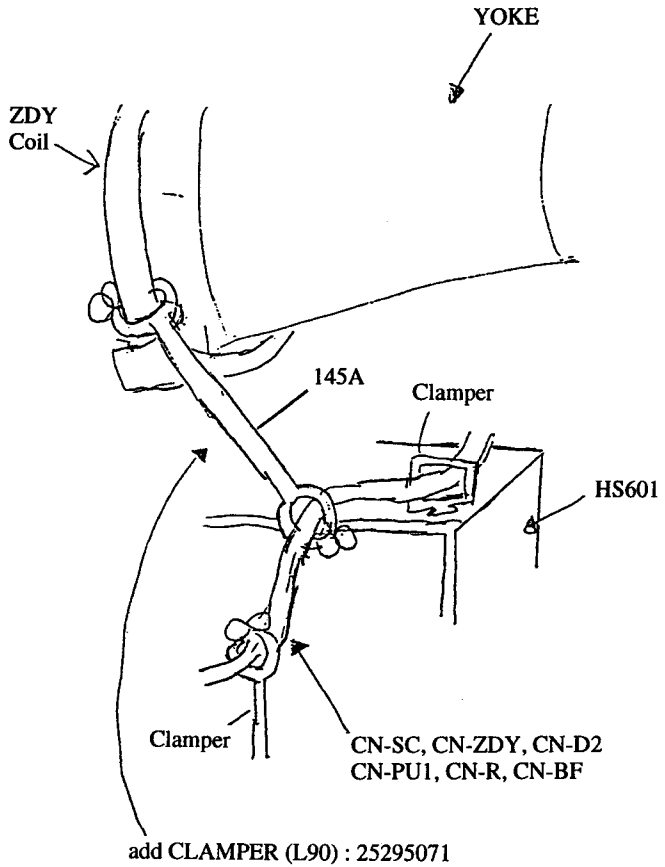


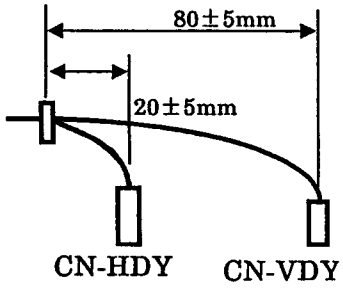
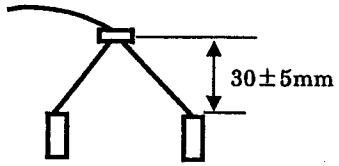
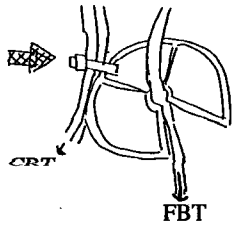
REMARK	SYMBOL	
		

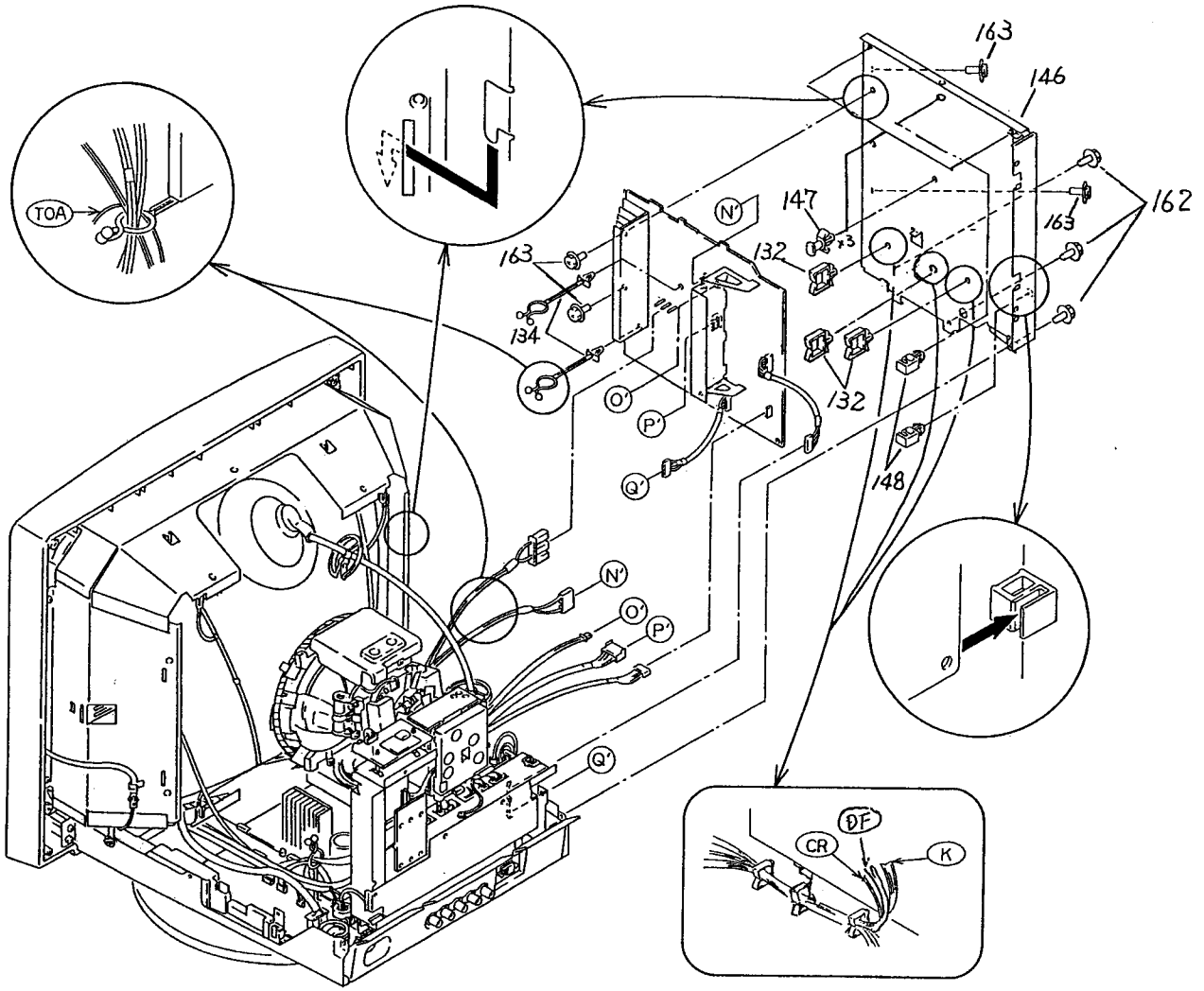
REMARK	SYMBOL	
		• Tie up as par sketch. (CN-SW4, CN-SC, ZDY, D2, PU1, R, BF, EMF)

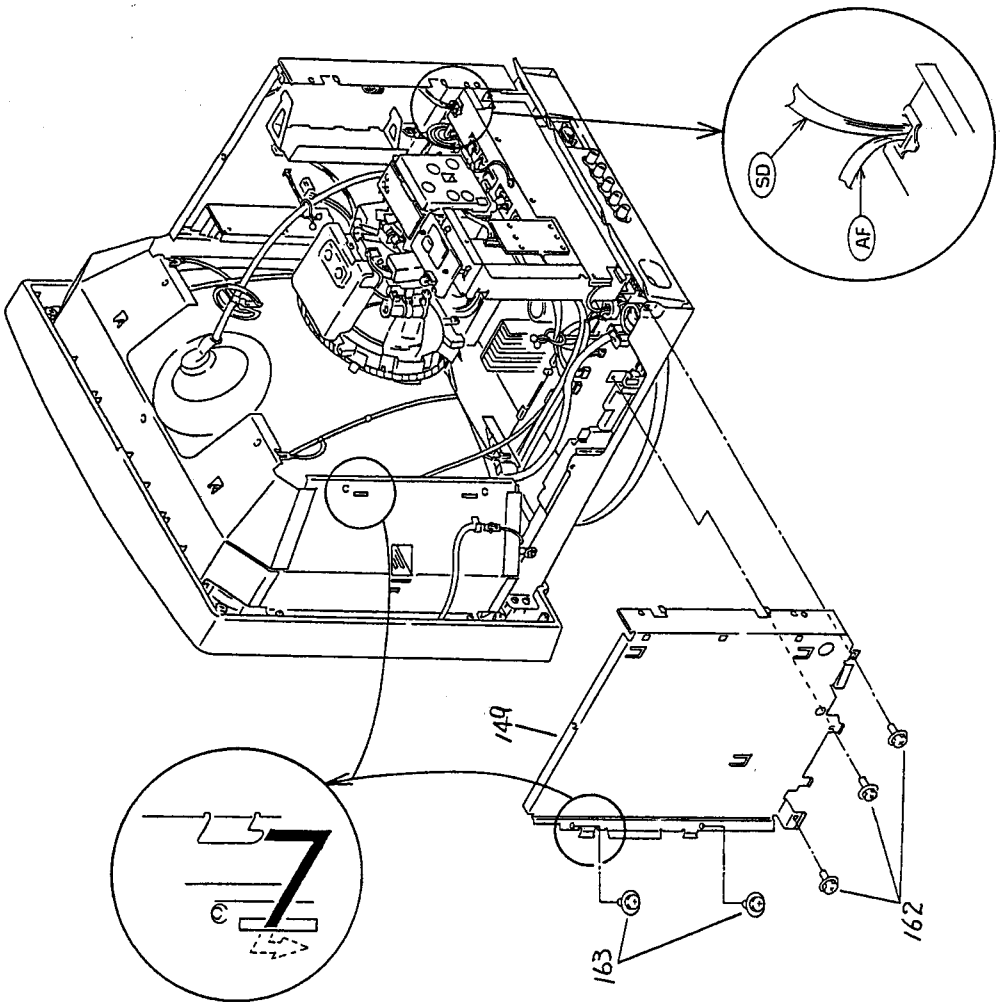


• Clamp as par sketch. (No. 145A)
(CN-SC, ZDY, D2, PU1, R, BF)



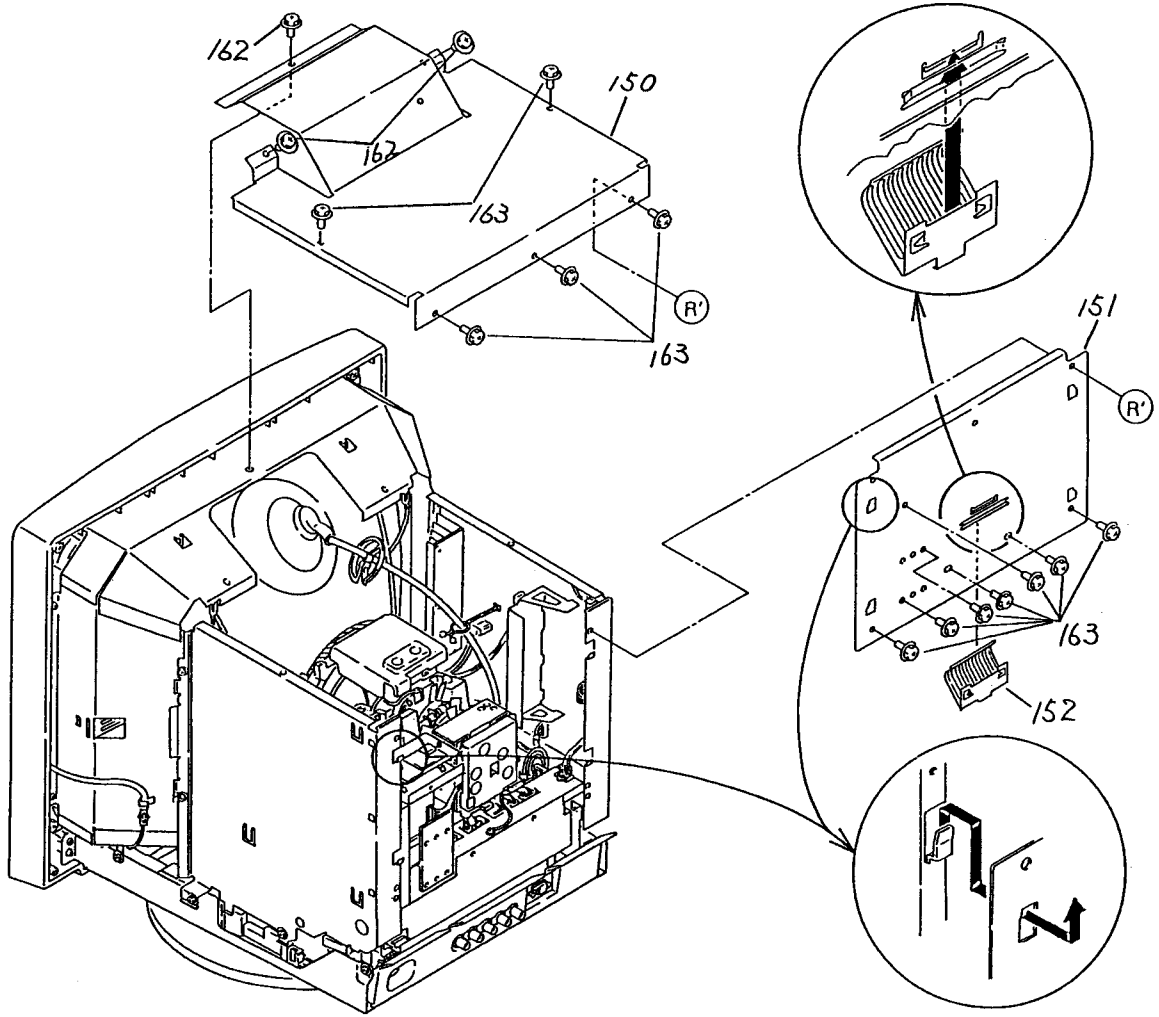
REMARK	SYMBOL
Tie up the CN-HDY and CN-VDY.  	155
Tie up the CN-DF and CN-SD.  	155
Clamp the ANODE LEAD with clamper (No.134). SAFETY	
Tie up the CN-HDY, VDY and ANODE CLAMPER.  	155



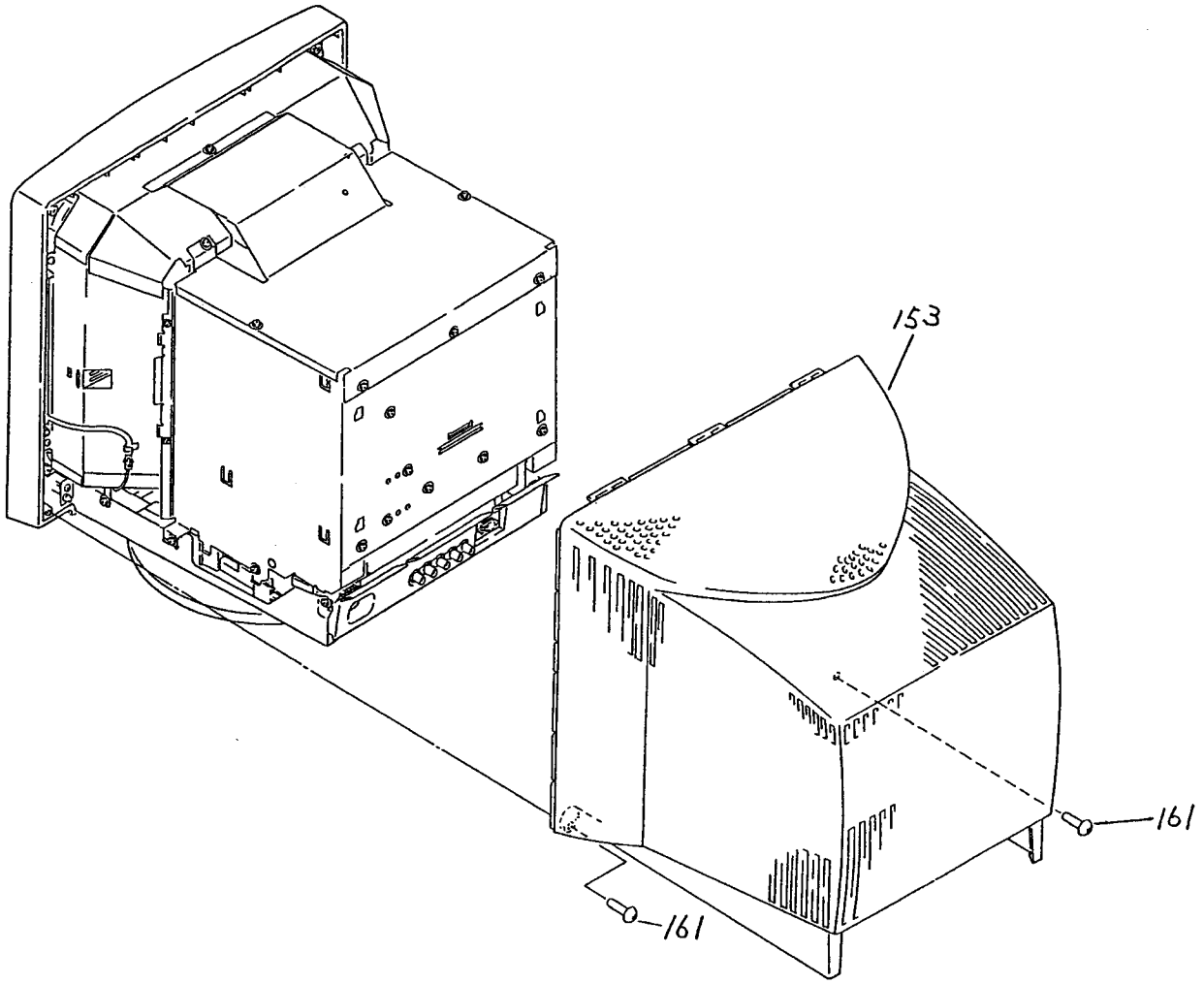


SYMBOL	
REMARK	

REMARK	SYMBOL
※1 Clamp the CN-T with CLANPER WIRE (No.107) on the PLATE SHIELDING(CRT).	



REMARK	SYMBOL



ADJUSTMENT PROCEDURES

Application

These specifications outline the adjustment procedures for Model JC-2148UMW(A/B/R/AS) 21 inch color monitor.

Model Name: JC-2148UMW(A/B/R/AS)

Destination: North America, Europe, Asia and the Southern Hemisphere

Standard Adjustment Conditions

Standard Adjustment Conditions

1. Power Supply Voltage

A/B/R/AS Version : AC 100V±5% 50/60Hz or AC 120V±5% 60Hz or AC 220V±5% 50Hz

2. Warm Up

Adjust this monitor after a minimum of sixty minutes to allow unit to reach ambient operating temperature.
(Use the Self Test screen. Refer item 7-5-3. about Self Test.)

※ Adjust the monitor according to item "Rough Adjustment before warm up" before warm up.

3. Signals

Video : Analog 0.7±0.01 Vp-p Positive (terminated at 75 ohms ±1%)
or
Analog sync on green
Video 0.7±0.01 Vp-p positive
Sync 0.3±0.01 Vp-p negative (terminated at 75 ohms ±1%)

Sync : TTL level
H/V separate, positive / negative
or
H/V composite, positive / negative
or
sync on green, 0.3±0.01 Vp-p negative (terminated at 75 ohms ±1%)

4. Magnetic Fields

	Vertical Magnetic Fields	Horizontal Magnetic Fields
A Version	45±1 μT	30±1 μT
B Version	40±1 μT	30±1 μT
R Version	-40±1 μT	30±1 μT
AS Version	0±1 μT	40±1 μT

* Unless instructed otherwise, the CRT face should be facing to the east.
* Degauss the entire unit with an external degaussing coil for the adjustment.

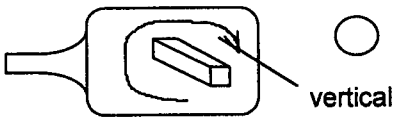
※Notes about degaussing method

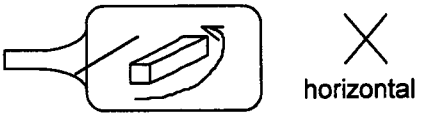
Follow the degaussing procedure below. (For prevent intertwinement of aperture grille)

1) Use cylinder-shaped degaussing coil. Do not use ring degaussing coil. But ring degaussing coil can be used at degaussing chassis.

2) In order to remove a magnetization from top sides, base shield and chassis, degauss each side.
Do not switch off the degaussing coil abruptly. Move the degaussing coil slowly when degaussing.
Note : If switch off the degaussing coil near the set, the set is magnetized.

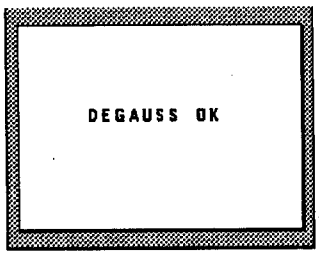
3) To degauss panel surface
When switch on the degaussing coil, keep distance between panel surface and degaussing coil to more than 50 cm. Move the degaussing coil vertically near the panel surface.
Keep distance of panel surface and degaussing coil to more than 15 mm.





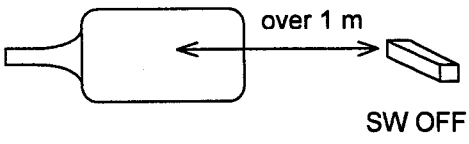
4) Degaussing method of CRT surface
Starting from edge of CRT, move the degaussing coil toward CRT center in circular motion, spending 6 to 7 seconds. (about 4 or 5 round)
Before you externally degauss the set, you must set the display to "DEGAUSS OK".

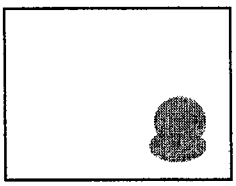
USER MODE



: Auto EMF function is on. (LED is green)
Open Menu(U), TAB7 "DISPLAY MODE" and go on pushing "▲" SW while pushing "+" SW. A "DEGAUSS OK" mesage will be displayed and set AUTO EMF to off. This condition is cancelled in some key input or power on/off. (AUTO EMF becomes on)

5) After sufficiently degaussing the CRT, move degaussing coil slowly away from the panel surface while rotating from corner to center, taking more than 3 seconds.
Turn off SW more than 1 m away from the CRT. Degauss again if the unit is gaussed.





Magnetized Pattern Example

5. Signal Generator

LVG-1603 is recommended for signal generator.

Use calibrated signal generators. However, use VG-819 in focus regulation.

Note) Adjustment timings are timing tables and are not programmed timing.

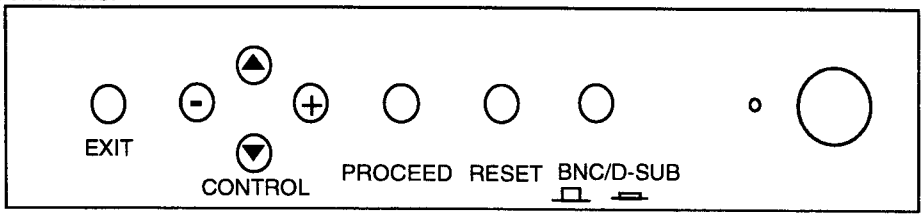
6. Color Analyzer, Convergence Meter

The color analyzer should be CA-100 (made by MINOLTA) or compatible.

The convergence meter should be CC-100 (made by MINOLTA) or compatible.

7. OSM Menu Operation

7-1. Front Panel



7-2. OSM Menu

This unit is adjusted in on screen menu by front panel key operation.

There are 2 types of On Screen menu.

(1) Menu (user): This Menu can be operated by a customer.

(2) Menu (service): This Menu is hidden from a customer.

Here after, they will be called MENU(U) and MENU(S).

The menu can be displayed when the signal is input to the display unit.

7-3. Service menu Setting

7-3-1. Service menu OFF → ON

(1) Open Menu(U),TAB7) "DISPLAY MODE".

(2) Push and hold "RESET" SW and push " - ", " + " SW at the same time.

(3) A "WARNING" message will be displayed. Push "PROCEED" SW once.

7-3-2. Service menu ON → OFF

(1) When OSM MENU is displayed and TAB is highlighted, push "EXIT" SW once.

7-4. Displaying the OSM (Open Menu)

Menu(U): Push switch "EXIT", "+", "-", "▲", or "▼" once.

Menu(S): Open Menu(U) ,TAB7) "DISPLAY MODE".

Push and hold "RESET" SW and push " - ", " + " SW at the same time.

A "WARNING" message will be displayed and push "PROCEED" SW once.

7-5. OSM Turn Off

* To Close the Menu

Push "EXIT" SW while Menu (U) or Menu (S) is displayed

While	TAB is highlighted	:	One time.
	ITEM is highlighted	:	Two times.
	entering SUB MENU	:	Three times.

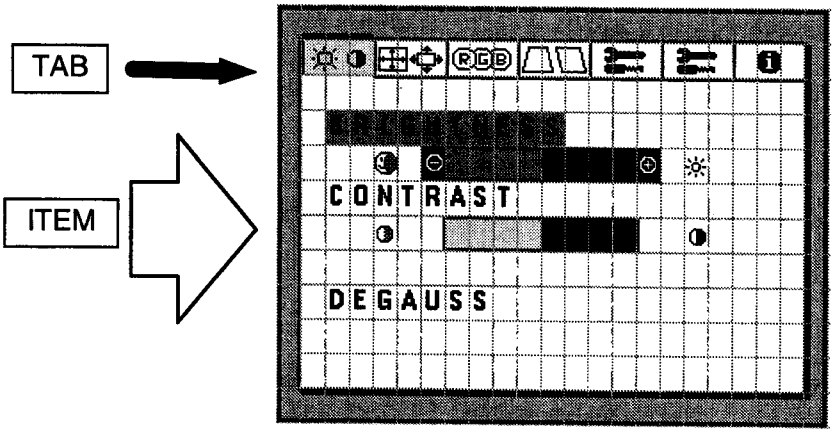
* To close MENU temporarily.

Push "PROCEED" SW once, while Menu (S) is being displayed.

Push "PROCEED" SW once more, Menu (S) is displayed again.

7-6. TAB, Item, Sub Menu Change

TAB to TAB	:	Push "-" SW or "+" SW.
TAB to item	:	Push "▲" SW or "▼" SW
Item to sub Menu	:	Push "PROCEED" SW once.
Item to item	:	Push "▲" SW or "▼" SW.
Sub Menu to item	:	Push "EXIT" SW once.
Item to TAB	:	When top item is selected, push "▲" SW. When bottom item is selected, push "▼" SW. Push "EXIT" all items.



7-7. To change Data Value

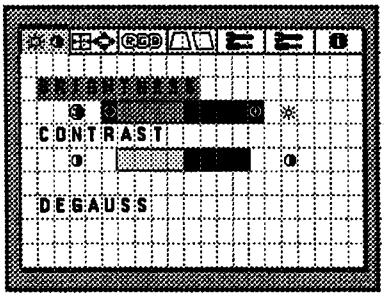
Data values are changed by pushing "-" or "+" SW.

7-8. To save Data Value

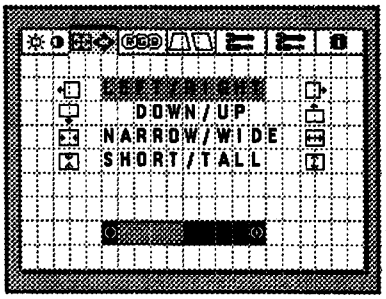
Data values are saved on EEPROM, when highlighted ITEM is changed.

7-9. Structure of OSM Menu (user)

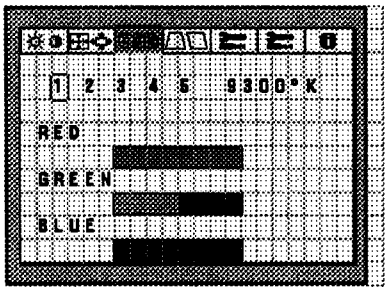
TAB 1) BRIGHTNESS & CONTRAST



TAB 2) SIZE & POSITION



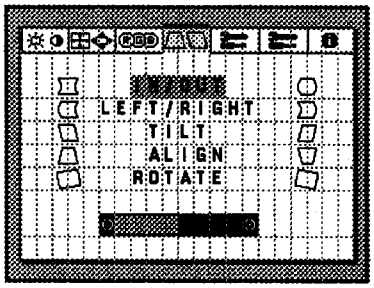
TAB 3) COLOR CONTROL



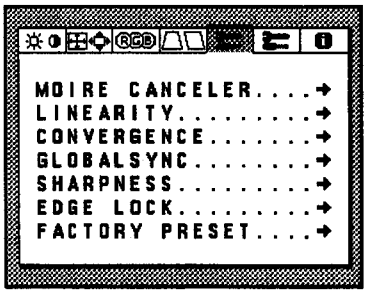
PRESET

No.1 (9300K) No.2 (8200K)
No.3 (7500K) No.4 (6500K)
No.5 (5000K)

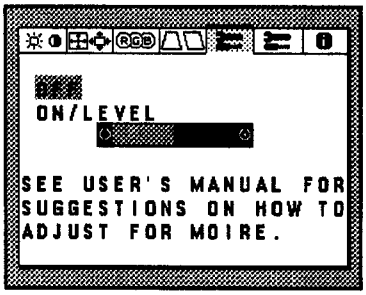
TAB 4) GEOMETRY



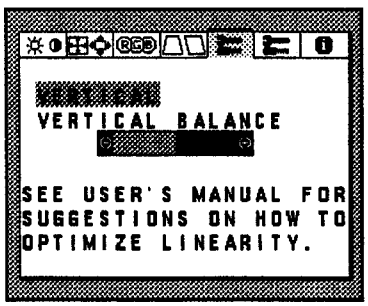
TAB 5) TOOL 1



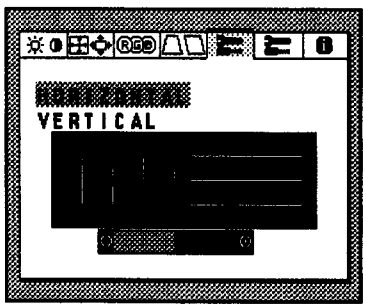
ITEM 5-1) MOIRE CANCELER



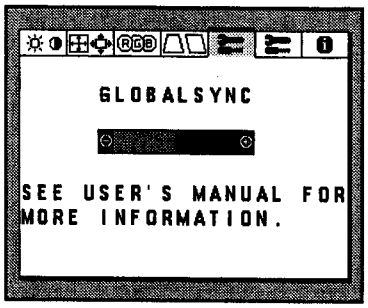
ITEM 5-2) LINEARITY



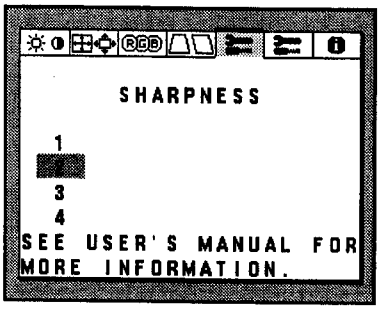
ITEM 5-3) CONVERGENCE



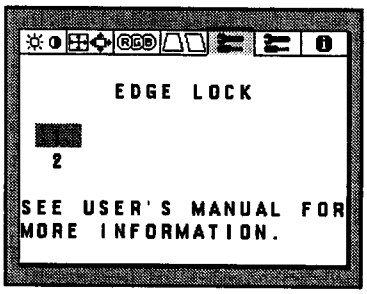
ITEM 5-4) GLOBALSYNC



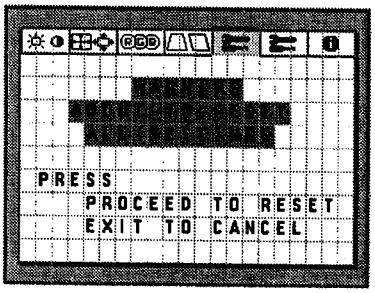
ITEM 5-5) SHARPNESS



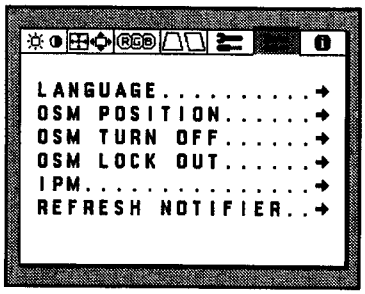
ITEM 5-6) EDGE LOCK



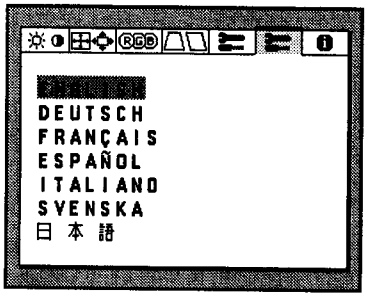
ITEM 5-7) FACTORY PRESET



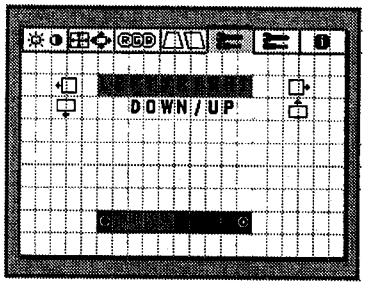
TAB 6) TOOL2



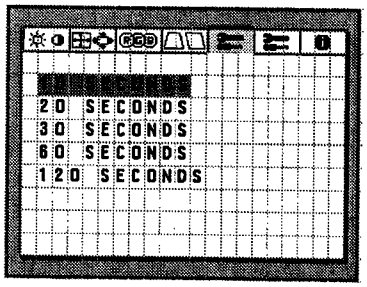
ITEM 6-1) LANGUAGE



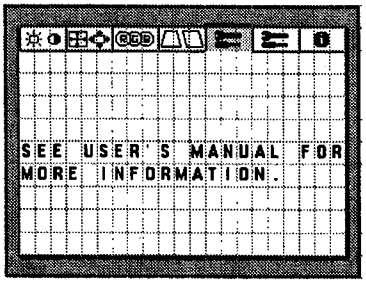
ITEM 6-2) OSM POSITION



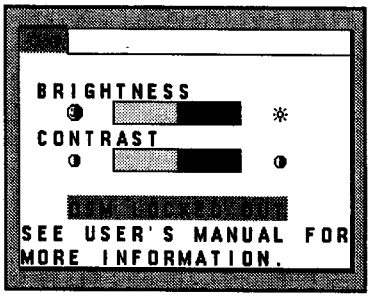
ITEM 6-3) OSM TURN OFF



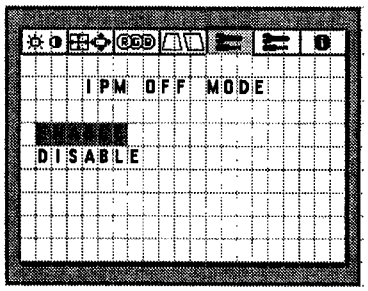
ITEM 6-4) OSM LOCK OUT



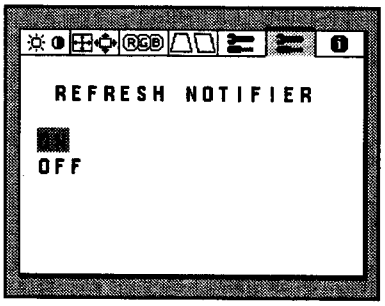
ITEM 6-4) OSM LOCK OUT



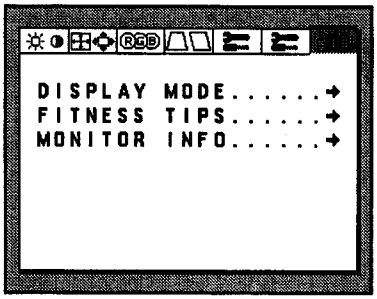
ITEM 6-5) IPM OFF MODE CONTROL FUNCTION



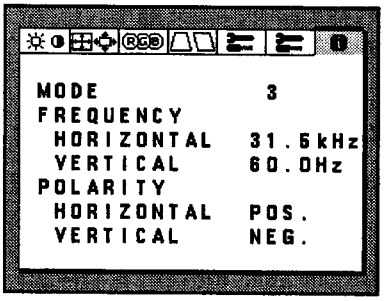
ITEM 6-6) REFRESH NOTIFIER



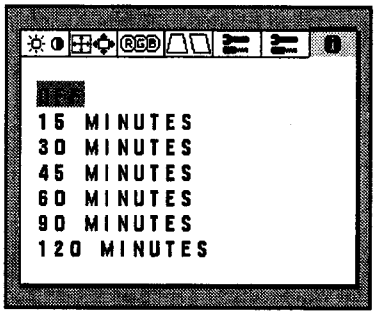
TAB 7) INFORMATION



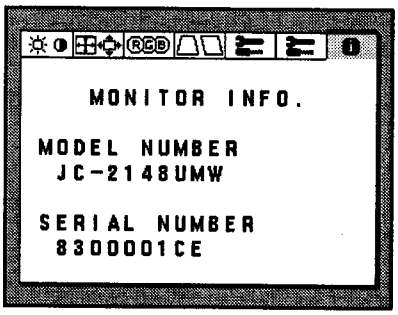
ITEM 7-1) DISPLAY MODE



ITEM 7-2) FITNESS TIPS

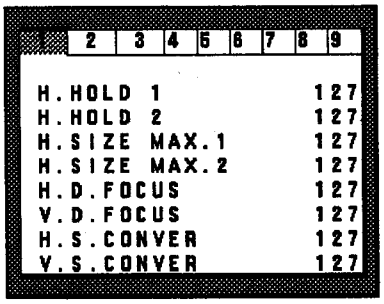


ITEM 7-3) MONITOR INFO

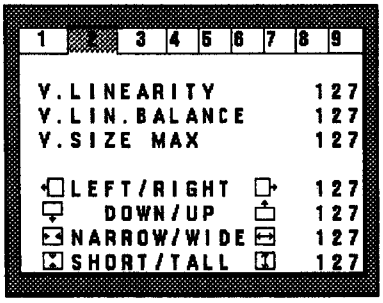


Structure of OSM Menu (service)

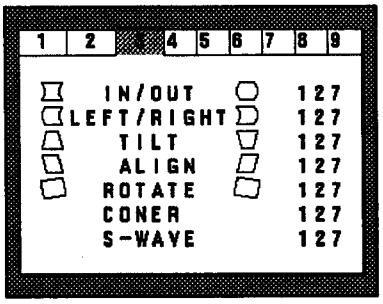
[TAB 1 (S)]



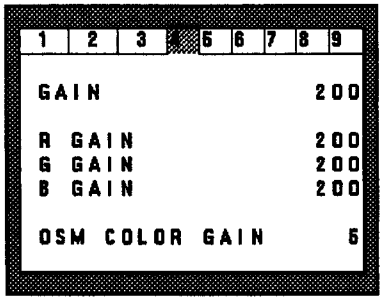
[TAB 2 (S)]



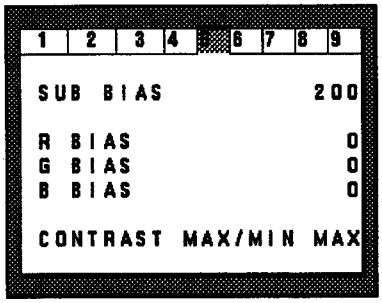
[TAB 3 (S)]



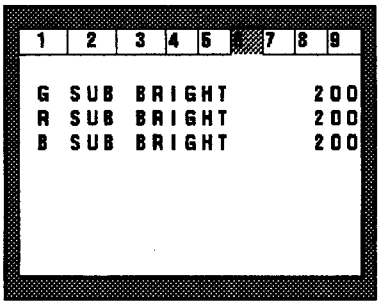
[TAB 4 (S)]



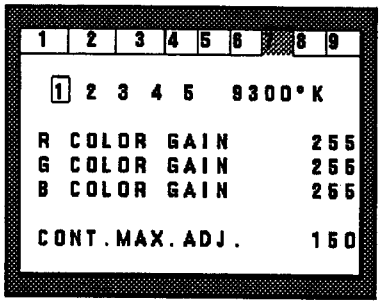
[TAB 5 (S)]



[TAB 6 (S)]



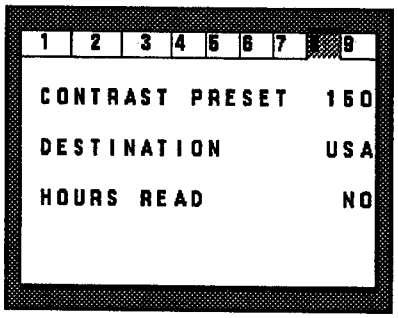
[TAB 7 (S)]



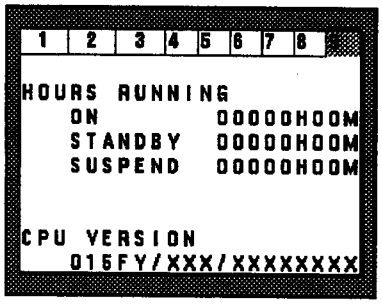
PRESET

No.1 (9300K) No.2 (8200K)
No.3 (7500K) No.4 (6500K)
No.5 (5000K)

[TAB 8 (S)]



[TAB 9 (S)]



8. Self test

Self test is displayed when the monitor is turned on while push and hold "RESET" SW.

To cancel Self test mode, the monitor should be turned off and on.

ADJUSTMENT ITEMS

[A] Pre-Adjustment

1. High-Voltage Adjustment ⚠

[B] Initial Settings

1.Control Setting

[C] Main Adjustment

1. Horizontal Hold Adjustment
2. Horizontal Raster Position

*3. Horizontal Maximum Size Adjustment

*4. Vertical Linearity Adjustment

5. Vertical Maximum Size Adjustment

*6. Deflection Distortion Adjustment

- 6-1. Horizontal / Vertical Size Rough Adjustment
- 6-2. Picture Tilt Adjustment
- 6-3. Side Pincushion Balance Adjustment
- 6-4. Side Pincushion Adjustment
- 6-5. Trapezoid distortion Adjustment
- 6-6. Corner Distortion Adjustment
- 6-7. Parallelogram Distortion Adjustment
- 6-8. Vertical S-wave Distortion Adjustment
- 6-9. Overall Distortion Adjustment

*7. Preset Picture Size And Position Adjustment

8. Auto adjustment (use the alignment jig for good efficiency)

*(As for step 3, step 4, step 6, step 7, it can be substituted in step 8.)

9. Video Amplitude Adjustment

- 9-1. Settings
- 9-2. Video Amplitude
- 9-3. OSM Gain Adjustment
- 9-4. Cut Off Adjustment ⚠
- 9-5. Contrast Tracking Adjustment
- 9-6. Brightness Tracking Adjustment
- 9-7. Color Preset Adjustment
- 9-8. Maximum Brightness Adjustment
- 9-9. Contrast preset adjustment

10. Focus Adjustment

11. Convergence

12. Purity

[D] Reference

1. Adjustment Signal
2. Timing of Adjustment Signals
3. Position of Connector / Test point of Adjustment

[A] Pre-Adjustment

1. High-Voltage Adjustment Signal 3 (VGA480) All Black

Initial Setting

SCREEN VR : Fully counterclockwise (MIN)
VR5T1 : Fully counterclockwise (MIN)

1) Receive signal 3.
2) Adjust VR5T1 slowly so that high voltage is 27kV±0.2kV.

After adjusting , seal VR5T1 with a silicon adhesive and cap (74106841).

[B] Initial Settings

1. Control Setting

Before adjusting, set the position of control as follows.

FBT	SCREEN VR	: Fully counterclockwise (MIN)
	FOCUS F1	: Mechanical center
	FOCUS F1	: Mechanical center
VR581		: Fully clockwise (MAX)
VR401		: Mechanical center
SW581		: CRT side

[C] Main Adjustment

Use this manual for aligning the monitor.

(1) Push "RESET" SW to reset a highlighted item.
(2) Close menu and turn the power off.
(3) Turn the monitor back on and confirm that the adjustment values / contrast / white balance / distortion values are the same before the Menu was closed.
(When "PROCEED" SW is pushed by the condition which Menu (S) is displayed, OSM Menu will disappear. If "PROCEED" SW is pushed once more, OSM displays)

Previous setting

Signal : No. 3 (VGA480) All White

(1) Screen VR setting
Open Menu(U), TAB 2 "BRIGHTNESS & CONTRAST" and push "RESET" SW.
Adjust SCREEN VR so that the back-raster is just disappeared.
(2) FOCUS VR setting
Display OSM menu and adjust FOCUS F1 VR and F2 VR to be able to recognize characters.

(3) Rough Adjustment before warm up

Signal : No. 6 (VESA350) All White
Signal : No. 12 (MAC832*624) All White
Signal : No. 38 (H.HOLD 2(110K) fH=110kHz) All Black

a. Rough adjustment of horizontal raster position

① Receive signal 38.
② Adjust SCREEN VR on the FBT so that the back raster just appears.
③ Make sure to set the position of control as follows :
VR581 (on the DEF PWB) : Fully clockwise (MAX)
SW581 (on the DEF PWB) : CRT side
④ Open Menu(S), TAB2 "NARROW/WIDE" and adjust the horizontal size to inside the bezel.
⑤ If raster has approached on the left of displayed area, switch SW581 position to the CRT side.
If raster has approached on the right of displayed area, switch SW581 position to VR581 side.
⑥ Adjust VR581 so that the raster edge is centered in the bezel.
⑦ Adjust SCREEN VR on the FBT so that the back raster just disappears.

b. Rough adjustment of self test screen

① Receive signal 6 (all White).
② Open Menu(S), TAB2 "DOWN / UP" and adjust "+", "-" SW so that the picture is centered with in the screen.
③ Open Menu(S), TAB2 "SHORT / TALL" and adjust "+", "-" SW so that the picture size is just the bezel. If not able to set picture size, open Menu(S), TAB2 "V.SIZE MAX", adjust the picture size is just the bezel. And open Menu(S), TAB2 "SHORT/TALL" and adjust "+", "-" SW so that the picture size is just the bezel.
④ Receive signal 12 (all White).
⑤ Open Menu(S), TAB2 "NARROW/WIDE" and adjust the picture size is just the bezel.
⑥ Display the self test screen.
⑦ Make sure that the picture size is just the bezel.

1. Horizontal Hold Adjustment

Signal: No.22 (H.HOLD 1 fH=31kHz) All White
No.38 (H.HOLD 2(110K) fH=110kHz) All White

(1) Receive signal 22.
(2) Open Menu(S), TAB 1 "H.HOLD 1" and push "RESET" SW.(This is free run mode)
(3) Adjust SWs "+" and "-" so that there is one screen.
(4) Change Menu (S) "H.HOLD 1" to "H.HOLD 2" by "▼" SW.
(5) Receive signal 38.
(6) Open Menu(S), TAB 1 "H.HOLD 2" and push "RESET" SW.
(7) Adjust SWs "+" and "-" so that there is one screen.
(8) Push "▲" SW. (This is the normal screen)
(9) Receive signal 22 and check the screen that there is one image.
If the screen is not stable, repeat steps (2) to (9).

2. Horizontal Raster Position

Signal: No.38(H.HOLD2 (110K) fH=110kHz) All Black

(1) Receive signal 38.

(2) Adjust SCREEN-VR on the FBT so that the back raster just appears.

(3) Make sure to set the position of control as follows.

VR581: Fully clockwise(MAX)

SW581: Set position to the CRT side

(4) Open Menu(S), TAB2 "NARROW/WIDE", Horizontal Size and adjust "+", "-" SW so that the horizontal size is 384±2.0 mm.

(5) If raster has approached on the left of displayed area, change the SW581 position to the CRT side

If raster has approached on the right of displayed area, change the SW581 position to the VR581 side

(6) Adjust VR581 so that the distance between the bezel and raster edge is as follows.

$|X_{Left}-X_{right}| \leqq 1.0$ mm

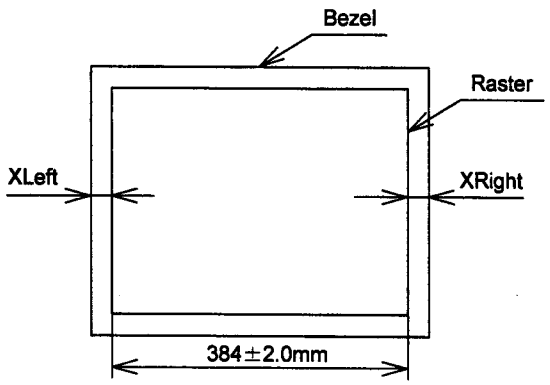


Fig 2-1 Horizontal Raster Centering

3. Horizontal Maximum Size Adjustment

Signal 23 (H.MAX) All White

Signal 29 (1600*1200@85Hz) All White

(1) Receive signal 23.

(2) Open Menu(S), TAB2 "SHORT / TALL" and adjust "+", "-" SW so that the vertical size is 288±5 mm.
If not able to set vertical size, open Menu(S), TAB2 "V.SIZE MAX", adjust the vertical size.
And open Menu(S), TAB2 "SHORT / TALL" and adjust vertical size.

(3) Open Menu(S), TAB3 "IN / OUT" and adjust "+", "-" SW to correct side pincushion distortion.

(4) Open Menu(S), TAB1 "H.SIZE MAX.1", push "RESET"SW and make sure that "H.SIZE MAX.1" is set to 1.

(5) Open Menu(S), TAB1 "H.SIZE MAX.1" and adjust "+", "-" SW so that the horizontal size is 384±2mm.

(6) Receive signal 29.

(7) Open Menu(S), TAB2 "LEFT/RIGHT" and adjust "+", "-" SW so that picture is centered with in the screen.

(8) Open Menu(S), TAB1 "H.SIZE MAX.2" and adjust "+", "-" SW so that the horizontal size is fullscan.

(9) Push "EXIT" SW.

4. Vertical Linearity Adjustment

Signal: No. 21 (1600*1200@75Hz) Cross hatch pattern

(1) Receive signal 21.
(2) Open Menu(S), TAB2 "DOWN / UP" and adjust "+", "-" SW so that the picture is centered with in the screen.
(3) Open Menu(S), TAB2 "SHORT / TALL" and adjust "+" SW so that the vertical size is 288±3 mm.
If not able to set vertical size, open Menu(S), TAB2 "V.SIZE MAX", adjust the vertical size is 288±3 mm.
After open Menu (S), TAB2 "SHORT / TALL" and adjust "+" SW so that the data is max.
(4) Open Menu(S) TAB2 "V.LINEARITY" and adjust "+", "-" SW to make size of top square and bottom square on the screen equal vertically.
Note: When a Menu is hidden temporarily for picture adjustment, push "PROCEED" SW once to display service Menu.
(5) Open Menu(S) TAB2 "V.LINEARITY" and adjust "+", "-" SW to make size of top square and bottom square on the screen equal vertically.
(6) Open Menu(S) TAB2 "V.LINEARITY" again and adjust "+", "-" SW to make size of top square and center square on the screen equal vertically.
(7) Make sure that the linearity of top, center, and bottom on the screen are ±3%.
(8) Push "EXIT" SW.

5. Vertical Maximum Size Adjustment Signal: No. 25 (V.MAX) All white

(1) Receive signal 25.
(2) Open Menu(S), TAB2 "DOWN/UP" and adjust "+", "-" SW so that the picture is centered with in the screen.
(3) Open Menu(S), TAB2 "V.SIZE MAX" and adjust "+" SW so that the Vertical Size is 288 mm±3 mm.

6. Deflection Distortion Adjustment

Environment: Adjustment Magnetic Field by three dimension magnetic field system.

Turn the CRT face to east and degauss the monitor using an external degaussing coil.

6-1. Horizontal / Vertical Size Rough Adjustment

Signal: No. 15 (1024*768@75Hz) All white

(1) Open Menu(S), TAB2 "LEFT / RIGHT", "DOWN / UP", "NARROW / WIDE", "SHORT / TALL" and adjust the screen size to the following values.

Horizontal Size: 384 mm ± 5 mm

Vertical Size: 288 mm ± 3 mm

Note: Hide the OSM Menu when confirming the adjustments.

6-2. Picture Tilt Adjustment

Signal: No. 15 (1024*768@75Hz) Cross Hatch Pattern

(1) Receive signal 15.

(2) Open Menu(S) TAB3 "ROTATE" and make sure that initial value of adjustment data is "128".

(3) Turn the CRT face to east and degauss the monitor using an external degaussing coil.

(4) Make sure that the picture tilt meets the following specification.

$X \leqq \pm 2.0$ mm

If out of specification, correct CRT assembly.

(5) Open Menu(S) TAB3 "ROTATE" and make sure that the picture is tilted as follows by "+", "-" SW.

"-" SW : counterclockwise

"+" SW : clockwise

(6) Open Menu(S) TAB3 "ROTATE" and adjust "+", "-" SW so that the picture tilt meets the following standards. The maximum correction is ±1.0mm.

$X \leqq \pm 1.0$ mm

(7) Push "EXIT" SW.

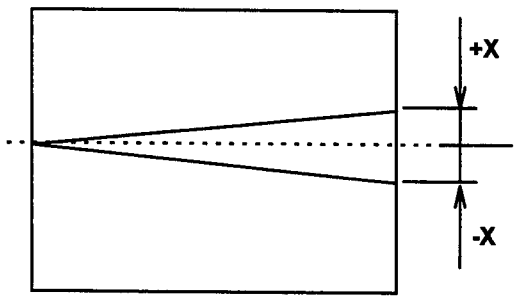


FIG 6-1 Picture Tilt

6-3. Side Pincushion Balance Adjustment

Signal: No. 15 (1024*768@75Hz) All white

(1) Open Menu(S), TAB3 "LEFT / RIGHT".
Adjust "+", "-" SW so that the difference of XSL and XSR is equal (maximum 1.0 mm).

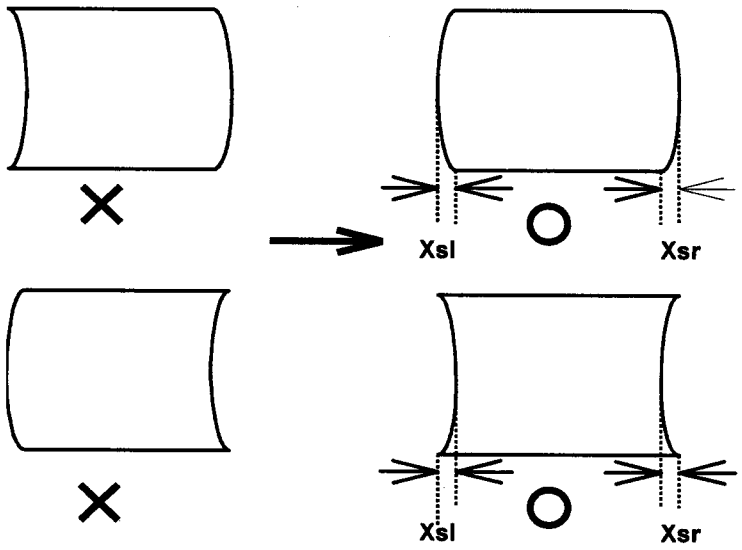


FIG 6-2 Side Pincushion Balance

6-4. Side Pincushion Adjustment

Signal: No. 15 (1024*768@75Hz) All white

(1) Open Menu(S), TAB3 "IN / OUT".
Adjust "+", "-" SW so that the side pincushion distortion is small (maximum ± 0.5 mm).

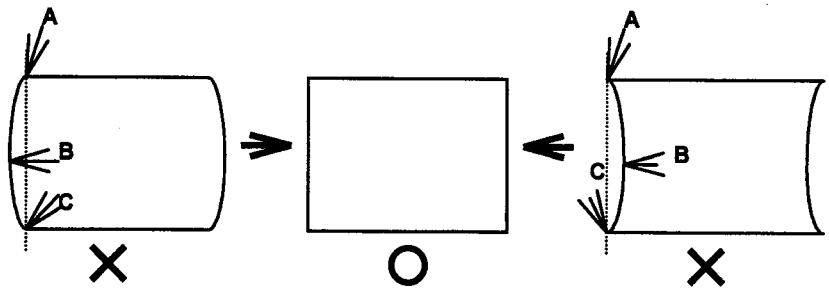


FIG 6-3 Side Pincushion

6-5. Trapezoid Distortion Adjustment

Signal: No. 15 (1024*768@75Hz) All white

(1) Open Menu(S), TAB3 "ALIGN".
Adjust "+", "-" SW so that the Trapezoid Distortion is equal to Xtop and Xbtm. (| Xtop - Xbtm | ≦ 1.0 mm)

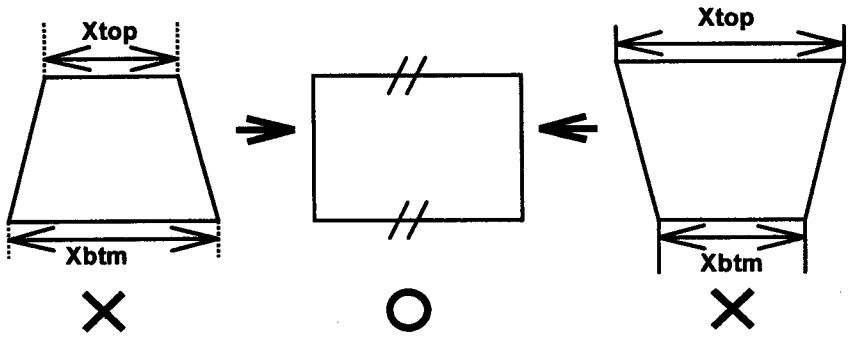


FIG 6-4 Trapezoid Distortion

6-6. Corner Distortion Adjustment

Signal: No. 15 (1024*768@75Hz) All white

(1) Open Menu(S), TAB3 "CORNER".
Adjust "+", "-" SW so that the corner forms a right angle. (maximum ± 1.0 mm)

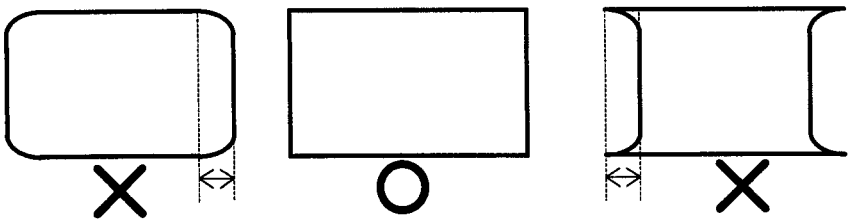


FIG 6-5 Corner Distortion

6-7. Parallelogram Distortion Adjustment

Signal: No. 15 (1024*768@75Hz) Cross Hatch Pattern

(1) Open Menu(S), TAB3 "TILT".
Adjust "+", "-" SW so that the vertical line and horizontal line at the screen's center fall at right angles.
(maximum 90° ± 0.5°)

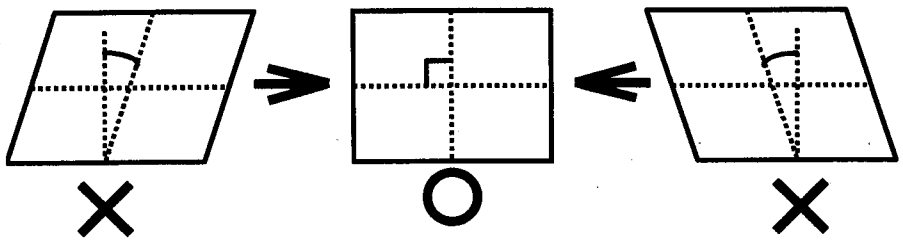


FIG 6-6 Parallelogram Distortion

6-8. Vertical S-wave Distortion Adjustment

Signal: No. 15 (1024*768@75Hz) All white

(1) Open Menu(S), TAB3 "S.WAVE".

Adjust "+", "-" SW so that the side vertical line is about straight. (maximum ± 0.5 mm)

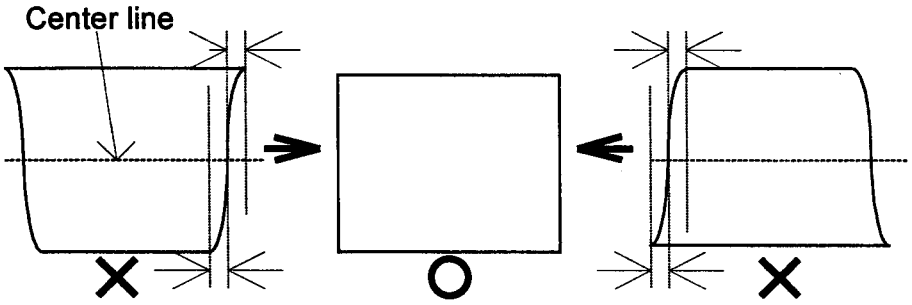


FIG 6-7 Vertical S-wave Distortion

If Trapezoid Distortion is out of specification, repeat adjustment step 6-5.
It implements this adjustment in case of the following Undulation distortion.
Undulation is a directional difference of tilt at AB and DE.
Following figures (I) and (II) are example.

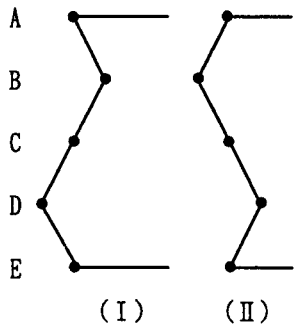


FIG 6-8 Vertical S-wave Distortion Definition

6-9. Overall Distortion Adjustment

Signal: No. 15 (1024*768@75Hz) All white

(1) Confirm that adjustment on steps 6-2 to 6-8 meets the specifications.

(2) If undulating, re-adjustment each distortion adjustment.

Undulation is a directional difference of tilt at either AC and CE or both.

Following figures (I) and (II) are example. AB and BC, CD and DE are the direction of tilt.

Undulated correction is the same direction of tilt at AB and BC, CD and DE.

Following figures (III) and (IV) are example. In this state, each adjustment standard must be met.

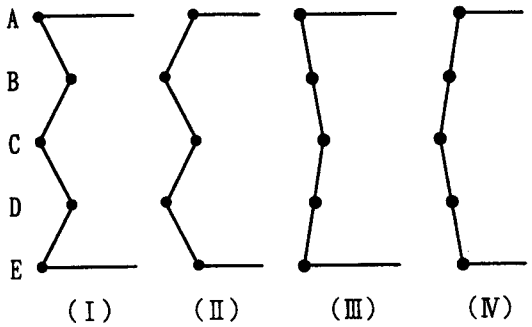


FIG 6-9 Undulated Definition

7. Preset Picture Size and Position Adjustment

Signal: No. 3 (VGA480)
No. 5 (MAC 640*480)
No.11 (VESA 640*480@85Hz)
No.12 (MAC 832*624)
No.13 (800*600@85Hz)
No.15 (1024*768@75Hz)
No.20 (1280*1024@75Hz)
No.21 (1600*1200@75Hz)
No.29 (1600*1200@85Hz)

Video: All White

(1) Receive signal 3.
(2) Open Menu(S), TAB2 "LEFT / RIGHT", "DOWN / UP", "NARROW / WIDE", "SHORT / TALL".
(3) Adjust the picture size and position as listed below by "+", "-" SW.

Picture size
H : 384±1 mm
V : 288±3 mm

Picture Position
H : $|X_{Left} - X_{right}| \leqq 1.0$ mm
V : $|X_{top} - X_{bottom}| \leqq 1.0$ mm

(4) Push "EXIT" SW.
(5) Receive the next signal and repeat steps (2) - (4).

Note: Before receiving the next signal, always push "EXIT" SW to store adjustments.

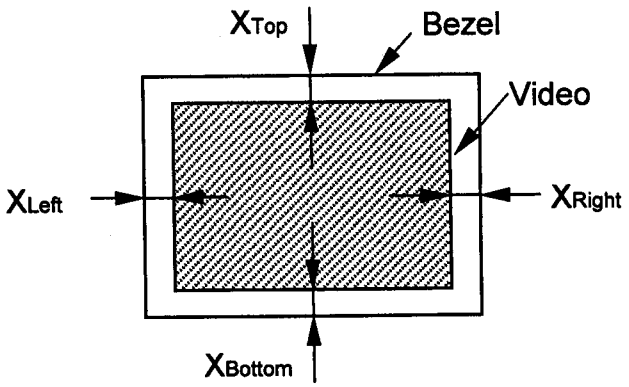


FIG 7-1 Picture Position

(6) For the signals below, picture size and position are calculated from above adjustment data and data are written into EEPROM.

Signal:
- No. 1 (VGA350)
- No. 2 (VGA400)
- No. 4 (800*600@60Hz)
- No. 6 (VESA350 @85Hz)
- No. 7 (VESA400 @85Hz)
- No. 8 (VESA640*480 @75Hz)
- No. 9 (XGA)
- No.10 (VESA800*600 @75Hz)
- No.14 (1024*768@70Hz)
- No.16 (1280*1024@60Hz)
- No.17 (Mac1152*870)
- No.18 (1024*768@85Hz)
- No.19 (1280*1024@70Hz)
- No. 35 (640*400 @70Hz)

USER Signal:
- USER2 (VESA 800*600@56Hz)
- USER3 (VESA 1024*768@60Hz)
- USER4 (VESA 800*600@72Hz)
- USER5 (1120*750@60Hz)
- USER6 (640*480@100Hz)
- USER7 (XGA-2 1024*768@72Hz)
- USER8 (1024*768@80Hz)
- USER9 (800*600@100Hz)
- USER10 (640*480@120Hz)
- USER11 (640*480@140Hz)
- USER12 (VESA 1600*1200@60Hz)
- USER13 (VESA1152*864@85Hz)
- USER14 (1024*768@100Hz)
- USER15 (800*600@120Hz)
- USER16 (640*480@160Hz)
- USER17 (1800*1440@60Hz)
- USER18 (1600*1200@70Hz)
- USER19 (1280*1024@85Hz)
- USER20 (800*600@140Hz)
- USER21 (1800*1440@70Hz)
- USER22 (VESA 1600*1200@80Hz)
- USER23 (1024*768@120Hz)
- USER24 (800*600@160Hz)

H : 384 mm	V : 288 mm

8. Auto Adjustment (Size / Position / Distortion)

8-1. Outline explanation

(1) Adjustment for Size, Position and Distortion for all preset signal can be done by selecting only one specified signal.
Accordingly, following adjustments can be done automatically by using this jig.
- Horizontal / Vertical Size Adjustment (include Max Size Adjustment)
- Horizontal / Vertical Position Adjustment
- Distortion Adjustment

(2) The Menu of this adjustment is generic and they differ with every model.
But operation method is the same.

(3) In case of the Horizontal / Vertical Max Size Adjustments are not needed, adjustment is not performed. As for the Horizontal / Vertical Max Size Adjustment, there may be the models requiring two different signals. In that case, follow the displayed menu. In case of indication of service manual is two signals whereas display on the screen menu is only one signal, adjust it by indication of screen menu.

8-2. Equipment for Adjustment

(1) Auto ADJ I/F jig
(2) Signal Cable(BNC-DSUB)
(3) The software for auto ADJ I/F jig
(4) Printer cable (Should be prepared at your side.)
(5) PC (IBM PC/AT compatible) (Should be prepared at your side.)
(6) Signal generator

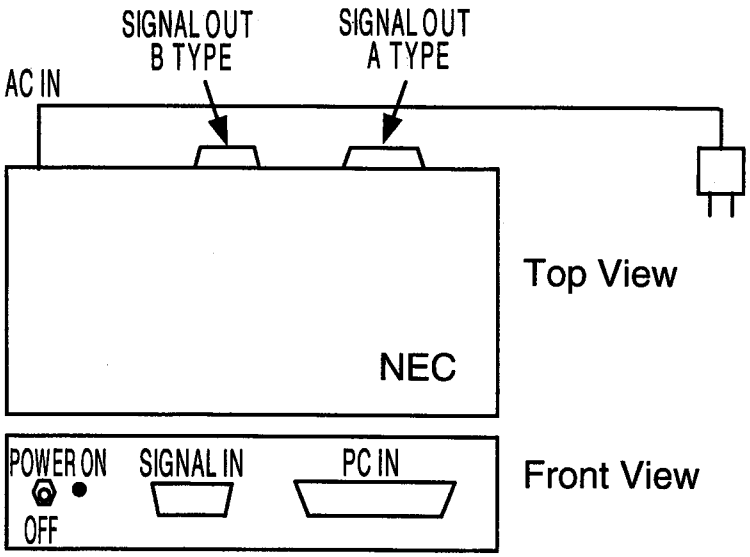


Fig 8-1 Auto ADJ I/F jig

8-3. Connection

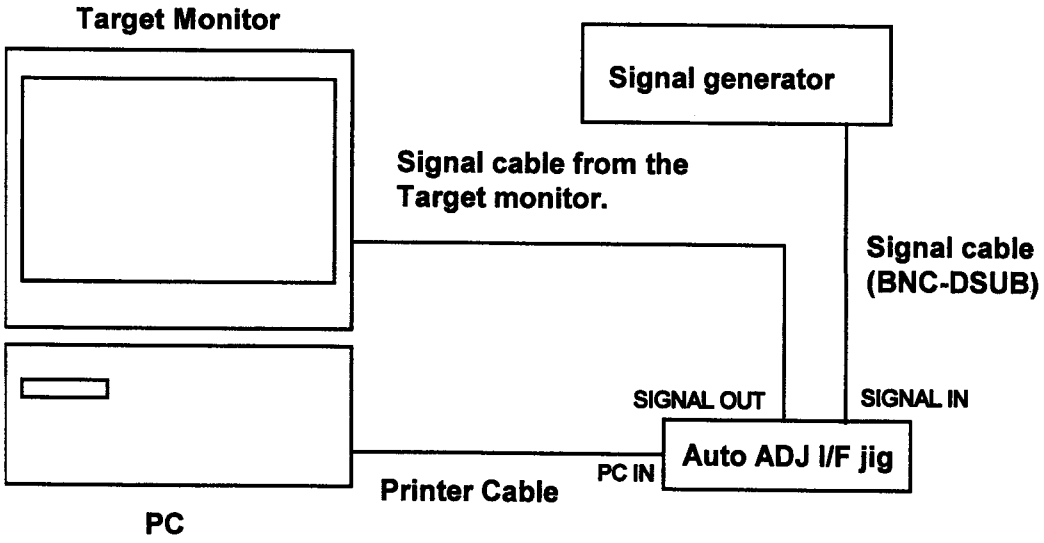


Fig.8-2 Connection

(1) Connect the signal cable (BNC-DSUB) to Auto ADJ I/F jig (From now on, this is abbreviated "JIG".) and the signal generator.

(2) Connect Printer cable to JIG AND PC.

(3) Connect the signal cable to Auto ADJ I/F jig from the target monitor.

(4) Power on the monitor, JIG and PC after set up the software for auto ADJ I/F jig in PC.

All adjustment for Size, Position and Distortion can be done from PC by using this jig.
Adjustment for Size, Position and Distortion for all preset signal can be done by selecting only one specified ("80 : TOTAL") signal.

Note : Distortion adjustment signal may differ from another type monitor in some cases.
In this case, use signal displayed on the screen menu.

8-4. Operation

(1) Programming flow chart

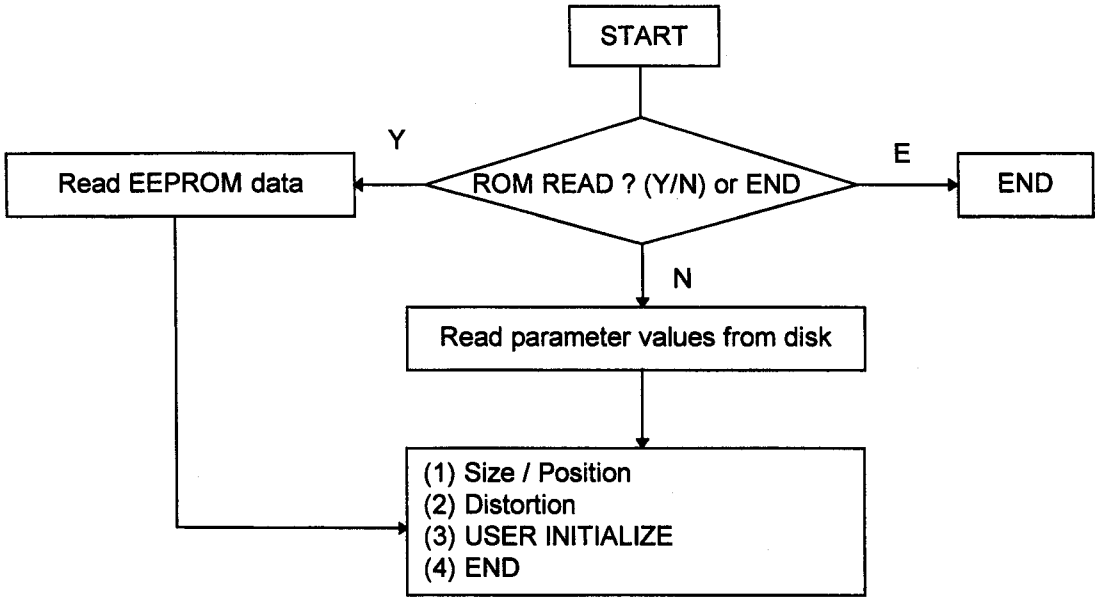


Fig 8-3 Programming flow chart of service adjustment

8-5. Adjustment procedures

(1) Start the program

a. Insert FD of software for auto ADJ I/F jig into PC.

b. Power on the monitor, auto ADJ I/F jig and PC.

c. As models list will appear on monitor screen, select the model number and push "RETURN" key.

d. As following message will appear on monitor screen, push "Y" or "N" key.

Size/Position Distortion Manual Adjust Program Version 1.01

ROM READ ? (Y/N) or END (E)

(Menu A)

If "Y" key is selected :

PC begins to read the data which is saved in EEPROM of the monitor, and to adjust the monitor using the data as reference.

If "N" key is selected :

PC begins to adjust the monitor using the data saved in program disk as reference.

Note : Push "N" key, when screen size and position are not correct and data are destroyed.
Also push "N" key, if you are not sure which reference to use.

If "E" key is selected :

PC ends adjustment program.

(2) Adjustment procedure

Adjust monitor in following steps.

a. USER INITIALIZE
b. Distortion adjustment
c. H. SIZE(MAX) adjustment
d. V. SIZE(MAX) adjustment
e. Size / Position adjustment

a. USER INITIALIZE

① The following menu B will appear on screen.
② Select "USER INITIALIZE" menu and push "RETURN" key.
③ Program begins "USER INITIALIZE" function.

1 : Size / Position
2 : Distortion
3 : USER INITIALIZE
4 : END

Note : Left menu may differ in some models.

(Menu B)

"1 : Size / Position" : Adjustment of size and position
"2 : Distortion" : Adjustment of distortion
"3 : USER INITIALIZE" : Write the size and position data written in the jig to monitor.
"4 : END" : Return to start menu screen

b. Distortion adjustment

① Select "Distortion" while menu B is displayed, and push "RETURN" key.
② As following menu will appear on monitor screen, adjust each item.
Input the adjustment signal that is specified as "80 : TOTAL" on menu D.

Note : Distortion adjustment signal may differ from another type of monitor in some cases.
In this case, use signal displayed on screen menu.

Distortion Adjust

1 : ROTATION
2 : PARALLELOGRAM
3 : TRAPEZOID
4 : PIN CUSHION
5 : PINCUSHION BALANCE
6 : CORNER
7 : V LINEAR
8 : V LINEAR BALANCE
9 : END

Note : Left menu may be differ in some models.

(Menu C)

c. H. SIZE(MAX) adjustment

① Select "Size / Position" while menu B is displayed, and push "RETURN" key.

② As following menu will appear on monitor screen, select "80 : TOTAL" and push "RETURN" key.

1 : VGA480
2 : MAC Ⅱ 640*480
3 : VESA 640*480@75
4 : 800*600@72
5 : MAC Ⅱ 832*624
6 : 1024*768@75
14 : VGA350
15 : VGA400
16 : 800*600@60
17 : EVGA350@84
18 : EVGA400@84
19 : XGA(8514/A)
20 : VESA 800*600@75
21 : VESA 640*480@85
22 : 800*600@85
23 : 1280*1024@60
24 : 640*480@100
25 : 1024*768@70
27 : PC98 640*400
80 : TOTAL (800*600@72)
81 : V. SIZE MAX(VGA400)
82 : END

No. ?

(Menu D)

Note : Left menu may differ in some models.

Meaning of each item in this menu is as follow :

From "1" to "27" : Adjust monitor on each signal
"81" : Adjust a vertical maximum size
"82" : Size / Position adjustment is ended

③ As following menu E appear on monitor screen, select "H. SIZE" and push "RETURN" key.

Size/Position Adjust

SIGNAL :TOTAL(800*600@72)
1 : H. POSI
2 : V. POSI
3 : H. SIZE
4 : V. SIZE
5 : H. SIZE(MAX)
6 : END

(Menu E)

④ As following menu F appear on monitor screen, push "5" key.
Then adjust data value to 255 by pushing one of "3", "6" and "9" keys.

Note : If screen is over scanned by smaller value than 255, push "RETURN" key to end "H. SIZE" adjustment.
Then select "5 : H. SIZE(MAX)" and decrease horizontal size, and set up data value to 255 at "H. SIZE" adjustment procedure.
In this case, you must be careful not to decrease horizontal size too small at "5 : H. SIZE(MAX)" adjustment.

Size/Position Adjust

SIGNAL :TOTAL(800*600@72)
1 : H. POSI
2 : V. POSI
3 : H. SIZE
4 : V. SIZE
5 : H. SIZE(MAX)
6 : END

No. ? 5
Decrease : 1(+1), 4(+5), 7(+10) Increase : 3(-1), 6(-5), 9(-10) Original : 5
END(NO WRITE) : e E END(WRITE) : ENTER

(Menu F)

Function of each key is as follows

"1" : data value decreases by 1 (H. SIZE becomes smaller)

"4" : data value decreases by 5 (H. SIZE becomes smaller)

"7" : data value decreases by 10 (H. SIZE becomes smaller)

"3" : data value increases by 1 (H. SIZE expands)

"6" : data value increases by 5 (H. SIZE expands)

"9" : data value increases by 10 (H. SIZE expands)

"5" : set up data value to reference value

"e or E" : ends without saving data

"ENTER" : Ends after saved data

⑤ Return to Size / Position adjustment menu by pushing "e" key, and select "5 : H. SIZE(MAX)". Adjust the horizontal size to horizontal maximum size adjustment value on service manual.

⑥ If adjustment is ended, push "RETURN" key to end the adjustment.
(H. SIZE MAX data values of all preset signals are written by this operation.)

d. V. SIZE(MAX) adjustment

① Open menu D, "81 : V. SIZE(MAX)" and push "RETURN" key.

② Input a signal displayed on the screen. (If signal is not displayed on the screen, use a signal indicated vertical maximum size adjustment section in the service manual.)

③ As following message will appear on screen, push "RETURN" key.

"INPUT V. SIZE(MAX) SIGNAL HIT ENTER KEY"

④ Following menu G will appear on screen.

INPUT V. SIZE(MAX) SIGNAL HIT ENTER KEY

DAC VALUE : 140

Decrease : 1(+1), 4(+5), 7(+10) Increase : 3(-1), 6(-5), 9(-10) Original : 5

END(NO WRITE) : e E END(WRITE) : ENTER

(Menu G)

⑤ Adjust a vertical maximum size value as indicated on the service manual.

⑥ If adjustment is ended, push "RETURN" key to end the adjustment.

e. Size / Position adjustment

① Open menu B, "Size / Position" and push "RETURN" key.
② As following menu D appears on monitor screen, select "80 : TOTAL" and push "RETURN" key.
③ As following menu E appears on monitor screen, select "H. POSI" and push "RETURN" key.
④ Menu F will appear on monitor screen.
⑤ Input a signal indicated by menu screen F. (If signal is not indicated on screen, input the signal that is specified as "80 : TOTAL" on menu D.)
⑥ Adjust the H. POSI to reference value which is specified on service manual by pushing "1", "4", "7", "3", "6" and "9" keys.
⑦ If adjustment is ended, push "RETURN" key to end the adjustment.
(H. POSI data values of all preset signals are written by this operation.)
⑧ Adjust V. POSI, H. SIZE and V. SIZE in the same way.
Adjust them as specified on the service manual.

f. Confirmation of Size / Position about another signals

① Open menu D, make sure that Size / Position values are in the standard of signals except "80 :TOTAL"signal.

Note : Do not forget to change signal of signal generator for each adjustment.

g. Handling when Size / Position are non-standard

① Open menu D, select non-standard signal and push "RETURN" key.
② When menu E is displayed on screen, select a non-standard item and push "RETURN" key.
③ Menu F will appear on monitor screen.
④ Input a non-standard signal.
⑤ Adjust the screen size / position again by pushing "1", "4", "7", "3", "6" and "9" keys.
⑥ If adjustment is ended, push "RETURN" key to end the adjustment.

Note : Do not perform the automatic adjustment ("80 : TOTAL"), after this adjustment is ended.
If you wrongly performed it, you must readjust this procedure.

9. Video Amplitude Adjustment　　Signal: No. 24 (Mac832*624) Window pattern

9-1. Settings

(1) Confirm that the video signal of generator is as follows.

Video: Analog 0.7 V p-p ± 0.01V p-p (terminated 75 ohms ± 1 %)

(2) Open Menu(S), TAB4,TAB5,TAB6,TAB7 and make sure that the following values are preset.

Menu(S), TAB4		Menu(S), TAB5	
GAIN	:200	SUB BIAS	:255
R GAIN	:200	R BIAS	:0
G GAIN	:200	G BIAS	:0
B GAIN	:200	B BIAS	:0
OSM COLOR GAIN	:5		

Menu(S), TAB6		Menu(S), TAB7	
G SUB BRIGHT	:150	COLOR PRESET	:1(9300K)
B SUB BRIGHT	:150	R COLOR GAIN	:255
R SUB BRIGHT	:150	G COLOR GAIN	:255
		B COLOR GAIN	:255
		CONT.MAX.ADJ.	:150

Menu(S), TAB8

CONTRAST PRESET:150

9-2. Video Amplitude

Signal: No.24 (MAC 832*624) Window Pattern

(1) Receive the signal 24.

(2) Open Menu(S), TAB4.

(3) Adjust "+", "-" SW so that video amplitude at TP-R (R GAIN) on the CRT PWB is set to 45 Vp-p(+0V/ -1V).

(4) When the indicated value of the video amplitude is not 45 Vp-p(+0V/ -1V) with Gain data maximum, increase the R Gain values.

(5) Adjust "+", "-" SW so that video amplitude at TP-G (G GAIN) ,TP-B (B GAIN) on the CRT PWB is set to 45 Vp-p(+0V/ -1V)

(6) Push "EXIT" SW

※ When adjusting video amplitude, move cursor to desired function and push PROCEED button to hide the OSM menu. Adjustment can be made with OSM menu hidden. OSM menu must be hidden since its amplitude will appear on the wave form.

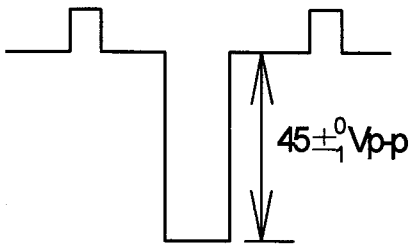


FIG 9-1 Wave form of RK, GK, BK

9-3. OSM Gain Adjustment

Signal: No.24 (MAC 832*624) all black

(1) Receive signal 24.

(2) Open Menu(S), TAB4 "OSM COLOR GAIN".

(3) Adjust "+", "-" SW so that OSM video amplitude at TP-G on the CRT PWB is set to 31 (±4) Vp-p.

(4) Push "EXIT" SW.

9-4. Cut off Adjustment

Signal: No.24 (MAC 832*624) all black

(1) Receive signal 24.

(2) Open Menu(S), TAB5 and push "RESET" SW.

Note :Do not touch a front panel key and do not come out from "SUB BIAS" since a picture can not be seen.

(3) Connect the DVM with a high voltage probe at TP-G2 on the CRT PWB and adjust SCREEN VR to obtain 700 Vdc ± 5 Vdc. (Use a high voltmeter whose maximum voltage is more than 1.5kV and input resistance is more than 1000 MΩ.)

(4) Set 00 channel x, y, Y modes of color analyzer CA-100 and make sure that the following values are preset.

x = 0.273

y = 0.300

Y = 0.2 cd/㎡

(5) Set analyzer mode at color analyzer.

(6) Open Menu(S), TAB5 " SUB BIAS " and increase Sub Bias data. The first signal color that appears is the reference color and adjust "+", "-" SW so that its color analyzer indicated value is 100±10.

Note 1: When the indicated value of the reference color is not 100 with Sub Bias date maximum, increase the reference color Bias and adjust the indicated values to obtain 100±10.

Note 2: When the reference color does not appear in Sub Bias maximum data, increase Green Bias value and adjust the indicated value to obtain 100±10.

(7) Increase the two color Biases data except the reference color and adjust each one to obtain 100±10.

9-5. Contrast Tracking Adjustment

Signal: No.24 (MAC 832*624) Window Pattern

(1) Receive Signal 24.
(2) Open Menu(S), TAB5 "CONT MAX/MIN". Adjust "+" SW so that the contrast is max.
(3) Setting modes x, y, Y at the color analyzer, measure the window color temperature.
This measurement determines x=x1, y=y1.
(4) Open Menu(S), TAB5 "CONT MAX/MIN". Adjust "-" SW so that the contrast is min.
(5) Measure the window color temperature.
This measurement determines x=x2, y=y2.
(6) Open Menu(S), TAB5 "G BIAS", "R BIAS", "B BIAS" and make sure that the window color temperature are the following values :

$x2 = x1 \pm 0.003$ $y2 = y1 \pm 0.003$

(7) Open Menu(S), TAB5 "CONT MAX/MIN". Adjust "+" SW so that the contrast is max
(8) Measure the window color and confirm that the readings are the following values :

$x1 = x2 \pm 0.003$ $y1 = y2 \pm 0.003$.

If not, repeat items (4) to (8).
(9) Push "EXIT" SW twice.

9-6. Brightness Tracking Adjustment

Signal: No.24 (MAC 832*624) all black

(1) Receive Signal 24.
(2) Set modes x, y, Y at color analyzer.
(3) Open Menu(S), TAB6 "G SUB BRIGHT", "B SUB BRIGHT", "R SUB BRIGHT" and push "RESET" SW. (Each figure becomes 0.)
(4) Adjust "+", "-" SW so that the "G SUB BRIGHT" is 5 ± 0.5 cd/㎡.
(5) Adjust "R SUB BRIGHT", "B SUB BRIGHT" and adjust "+", "-" SW so that the each color temperature measured in step 9-5.

$x = x1 \pm 0.002$
$y = y1 \pm 0.002$

(6) Push "EXIT" SW.

9-7. Color Preset Adjustment

Signal: No.37 (VESA800*600 @75Hz Windows) Window Pattern
All Black

(1) Receive Signal 37(window pattern).

(2) Open Menu(S), TAB7 and push "RESET" SW. (R/G/B COLOR GAIN value is made the early stages.)

(3) Open Menu(S), TAB7 ,Color Preset No. "1 9300k ".

(4) Adjust "R COLOR GAIN", "G COLOR GAIN", "B COLOR GAIN" so that the color temperature is the following value. (RGB either value make become 255 at this time.)

x = 0.283 ± 0.003

y = 0.297 ± 0.003

(5) Push "EXIT" SW.

(6) Open Menu(S), TAB7 ,and adjust Color Presets No.2 to 5 (8200K ~ 5000K) to the following values :

PRESET No.	x	y
2	0.290 ± 0.003	0.313 ± 0.003
3	0.300 ± 0.003	0.315 ± 0.003
4	0.315 ± 0.003	0.325 ± 0.003
5	0.345 ± 0.003	0.350 ± 0.003

9-8.Maximun Brightness adjustment

Signal: No.37 (VESA800*600 @75Hz Windows) Window Pattern

(1) Receive Signal 37(window pattern).

(2) Open Menu(S), TAB7 ,Color Preset No. "1 9300k ".

(3) Open Menu(S), TAB7 "CONT.MAX.ADJ". Adjust "+", "-" SW so that the "window brightness" is 140(+0, -1) cd/㎡.

(4) Open Menu(S), TAB8 "CONTRAST PRESET" and push "RESET" SW.

9-9.Contrast preset adjustment **(B version only)**

Signal: No.37 (VESA800*600 @75Hz Windows) Window Pattern

(1) Receive Signal 37(window pattern).

(2) Open Menu(S), TAB8 "CONTRAST PRESET".

(3) Adjust "+", "-" SW so that the "window brightness" is 90(+0, -1) cd/㎡.

10. Focus Adjustment

Signal:	No. 3 (VGA480)	Cross Hatch Pattern
	No. 37 (VESA800*600@75Hz)	Cross Hatch Pattern
	No. 28 (1280*1024@74Hz)	Cross Hatch Pattern
	No. 35 (1600*1200@60Hz)	Cross Hatch Pattern 4 Dots Missing Pattern(reverse)
		"∃ " Character Pattern

※ After maximum horizontal amplitude adjustment, maximum vertical amplitude adjustment, and video adjustment are completed, perform this focus adjustment.
For steps of (10) ~ (22), adjust it with signal input through BNC using signal generator VG-819 or alternate.

As for 1)-3), it applies to A/R/AS version.

(1) Receive Signal 37(window pattern).

(2) Open Menu(S), TAB8 "CONTRAST PRESET".

(3) Adjust "+", "-" SW so that the "window brightness" is 90(+0, -1) cd/㎡.

(4) Receive Signal 28(Cross Hatch pattern).

(5) Open Menu(S), TAB2 "NARROW / WIDE". Adjust horizontal screen size to obtain the following values.
H : 360 ± 1mm

(6) Open Menu(S), TAB2 "SHORT / TALL". Adjust vertical screen size to obtain the following values.
V : 288 ± 1mm

(7) Open Menu(S), TAB1.
Adjust the voltage at TP-DF on the SW/HV PWB to obtain the following values.
For the horizontal cycle voltage adjustment, use H. D. FOCUS VR.
For the vertical cycle voltage adjustment, use V. D. FOCUS.
Horizontal cycle : 475 V ± 10 Vp-p
Vertical cycle : 160 V ± 5 Vp-p

Note: When measuring Vp-p, use a 100:1 probe with capacitance of approx. 2pF.

(8) Push "EXIT" SW.

(9) Open Menu(U), TAB1.
Adjust "CONTRAST" is MAX, and adjust "BRIGHTNESS" is the back raster just disappears.
※ Set up in user menu to (11), (22).

(10) Receive Signal 35 (1600*1200(60Hz) Cross Hatch Pattern (Green Color)).

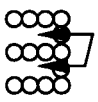
(11) Open Menu(U), TAB2 adjust "NARROW/WIDE" , "SHORT/TALL" so that H/V size are as wide/tall as possible within the bezel.

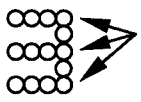
(12) Adjust FOCUS VR F2 so that vertical line is fine at point "A".

(13) Adjust FOCUS VR F1 so that horizontal line is fine at point "A".

(14) Receive signal 35("∃" Character, Green). Character code: AE, Font: 7x9

(15) Open MENU(S), TAB1 and adjust "H.D.FOCUS" so that halo of "∃" Characters are reduced at point "B" and point "C", especially point "B", and halo level at point "B" and point "C" are same level compared with point "A". Use a loupe (x10). Close the MENU.

a)  the gap between horizontal lines is crisp as possible

b)  horizontal lines do not form halos

(16) Receive signal PC pattern. (Recommended graphics card is MilleniumII.
Excel pattern: Resolution 1280x1024@75)

(17) Make sure the horizontal and vertical size are preset.

(18) Adjust Focus VR F1 so that horizontal is not double line and characters are fine on all area.

(19) Receive signal 35 ("o" Character, Green). Character code: A1, Font: 7x9
Make sure the holes in the "o" characters are seen all over the picture.

(20) Receive signal 35("o" Character, inverse). Character code: A1, Font: 7x9
Make sure the holes in the "o" characters are seen all over the picture.

(21) If focus is not uniform all over the picture, re-adjust from 9) to 17) item.
(NOTE: Adjust it so as certainly to become an end by adjustment F1 VR.)

(22) Open Menu(U), TAB2 and press RESET SW to reset H/V size.
"Warning" message will display, and return picture size to factory preset by pushing PROCEED button.

(23) Receive signal 3. (Cross-hatch, Red/Green/Blue each color)
Make sure halo is within the specification.

As for 24), it applies to A/R/AS version only.

(24) Open Menu(S), TAB8 "CONTRAST PRESET" and push "RESET" SW.

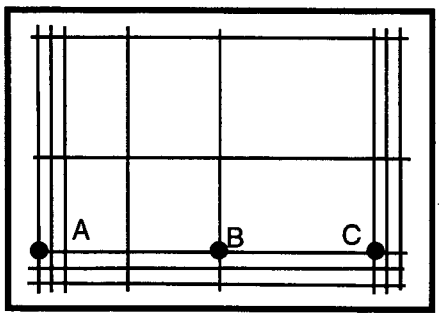


Fig 10-1 Focus Adjustment Points

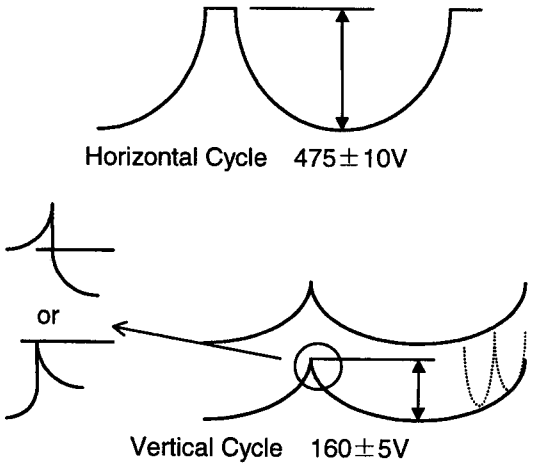


Fig 10-2 Dynamic Focus Wave Form

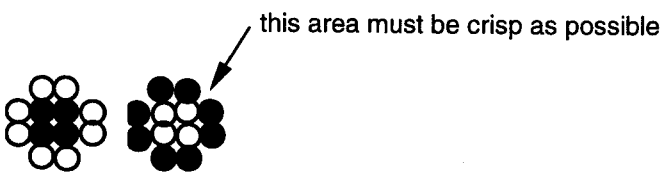


Fig 10-3 4 Dots Missing

11. Convergence

Signal: No. 39 (788*1200@75) Cross Hatch Pattern: B VERSION
No. 15 (1024*768@75) Cross Hatch Pattern: A/R/AS VERSION

Environment: Adjustment Magnetic Field by three dimension magnetic field system.
Turn the CRT face to east and degauss the monitor using an external degaussing coil.

As for (1),(4) it applies to A/R/AS version.

(1) A/R/AS VERSION ONLY.

- Receive Signal 37(window pattern).
- Open Menu(S), TAB8 "CONTRAST PRESET".
- Adjust "+", "-" SW so that the "window brightness" is 90(+0, -1) cd/㎡.
- Open Menu(U), TAB1 "CONTRAST","BRIGHTNESS" and push "RESET" SW.

(2) A version is receive signal 39(Cross Hatch Pattern) and make sure that the screen size is as shown.
A/R/AS version are receive signal 15(Cross Hatch Pattern) and make sure that the screen size is as shown.
H : 384 ± 2.0mm V : 288 ± 2.0mm

The adjustment confirmation is open Menu(S), TAB1 "H.S.CONVER" or " V.S.CONVER" and push "PROCEED" SW. OSM does in the condition, which isn't displayed.
When pushing PROCEED key once already, OSM is displayed.

(3) Measure misconvergence , by using following standards mentioned below.

① If it is over 0.21 mm at screen center, adjust the static convergence by using the 4-pole / 6-pole magnets on the CPM assembly.

② If misconvergence is less than 0.21 mm at screen center and if it is not satisfactory, open Menu(S), TAB3 "H. S. CONVER" and "V. S. CONVER". And adjust static convergence to correct.
Also, to meet the following standard, adjust VR/Coil on DY.
Note: The function of each VR, Coil is shown in figure 11-2-1,2.
For A/R/AS version: x, y ≦ 0.35 mm
For B version : x, y ≦ 0.3 mm

(4) A/R/AS VERSION ONLY.
Open Menu(S), TAB8 "CONTRAST PRESET" and push "RESET" SW.

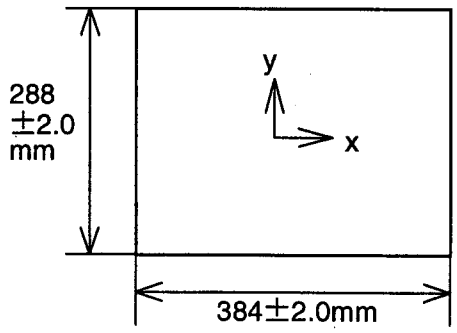


Fig 11-1 Convergence

The Convergence revision device specification

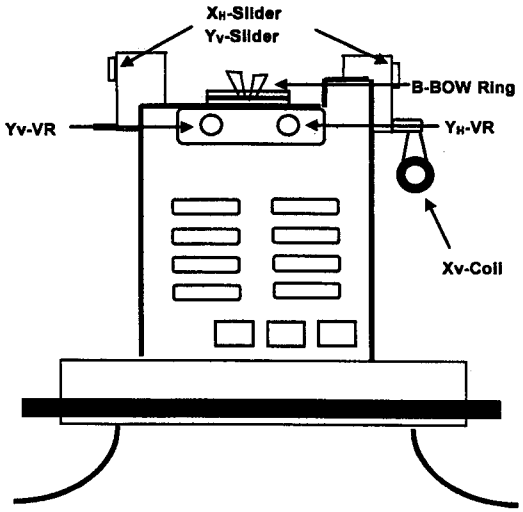


Fig 11-2-1 The position of VR, Coil of the revision on the slant yoke

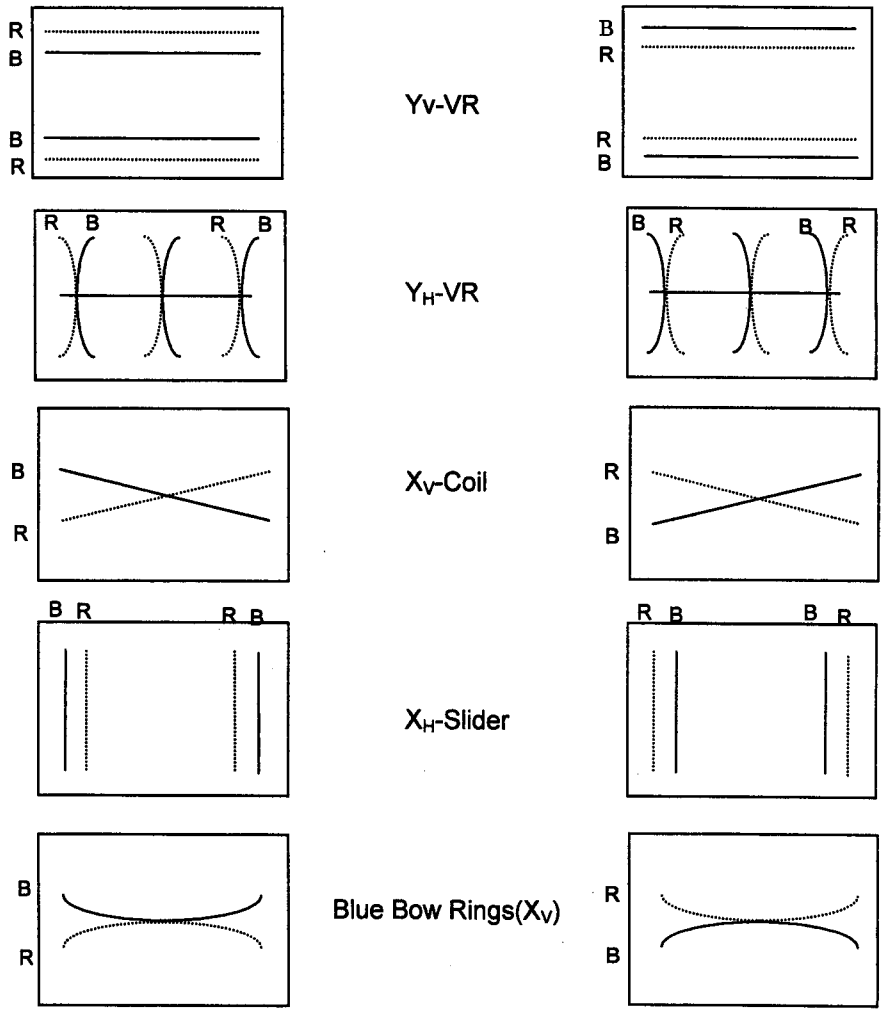


Fig 11-2-2 The change of the R,B line in revision VR, Coil

12. Purity

Signal: No. 39 (788*1200@75) All green

Environment: Adjustment Magnetic Field by three dimension magnetic field system.

Turn the CRT face to east and degauss the monitor using an external degaussing coil.

(1) Receive Signal 39 (788*1200@75) All green.

(2) When confirming Purity in the screen whole area and in case of aggravation's being seen, it sticks an adjustment and a magnet with CPM in fixed place and it makes an uniform screen.

Note: In case of adjustment, don't use "GLOBAL SYNC".

Also, Distortion, Convergence be careful of the style which isn't aggravated.

[D]. Reference

1. Adjustment Signal

NO.	Signal Name	SYNC Form	SYNC Polarity(H/V)
1	VGA 350	Separate	Pos/Neg
2	VGA 400	Separate	Neg/Pos
3	VGA 480	Separate	Neg/Neg
4	800*600@60Hz	Separate	Pos/Pos
5	MAC 640*480	Composite + Sync on G	Neg/Neg
6	VESA 350@85Hz	Separate	Pos/Neg
7	VESA 400@85Hz	Separate	Neg/Pos
8	VESA 640*480@75Hz	Separate	Neg/Neg
9	XGA	Separate	Pos/Pos
10	VESA 800*600@75Hz	Separate	Pos/Pos
11	VESA 640*480@85Hz	Separate	Neg/Neg
12	MAC 832*624	Composite + Sync on G	Neg/Neg
13	800*600@85Hz	Separate	Pos/Pos
14	1024*768@70Hz	Separate	Neg/Neg
15	1024*768@75Hz	Separate	Pos/Pos
16	1280*1024@60Hz	Separate	Pos/Pos
17	MAC 1152*870	Composite + Sync on G	Neg/Neg
18	1024*768@85Hz	Separate	Pos/Pos
19	1280*1024@70Hz	Sync on G	
20	1280*1024@75Hz	Separate	Pos/Pos
21	1600*1200@75Hz	Separate	Pos/Pos
22	H.HOLD1	Composite	※1
23	H.MAX	Separate	Neg/Neg
24	MAC-832(Window)	Sync on G	
25	V.MAX	Separate	Neg/Neg
27	EDID	Separate	Neg/Neg
28	1280*1024@74Hz	Separate	Neg/Neg
29	1600*1200@85Hz	Separate	Pos/Pos
31	640*400@70Hz	Separate	Neg/Neg
35	1600*1200@60Hz	Separate	Pos/Pos
37	VESA 800*600@75Hz(Window)	Separate	Pos/Pos
38	H.HOLD2(110K)	Separate	Pos/Pos ※1
39	788*1200@75	Separate	Pos/Pos

NO.	Signal Name	SYNC Form	SYNC Polarity(H/V)
USER2	VESA 800*600@56Hz	Separate	Pos/Pos
USER3	VESA 1024*768@60Hz	Separate	Neg/Neg
USER4	VESA 800*600@72Hz	Separate	Pos/Pos
USER5	1120*750@60Hz	Separate	Neg/Neg
USER6	640*480@100Hz	Separate	Neg/Neg
USER7	XGA-2 1024*768@72Hz	Separate	Neg/Neg
USER8	1024*768@80Hz	Separate	Pos/Pos
USER9	800*600@100Hz	Separate	Pos/Pos
USER10	640*480@120Hz	Separate	Neg/Neg
USER11	640*480@140Hz	Separate	Neg/Neg
USER12	VESA 1600*1200@60Hz	Separate	Pos/Pos
USER13	VESA 1152*864@85Hz	Separate	Pos/Pos
USER14	1024*768@100Hz	Separate	Pos/Pos
USER15	800*600@120Hz	Separate	Pos/Pos
USER16	640*480@160Hz	Separate	Neg/Neg
USER17	1800*1440@60	Separate	Pos/Pos
USER18	1600*1200@70Hz	Separate	Pos/Pos
USER19	1280*1024@85Hz	Separate	Pos/Pos
USER20	800*600@140Hz	Separate	Pos/Pos
USER21	1800*1440@70Hz	Separate	Pos/Pos
USER22	VESA 1600*1200@80Hz	Separate	Pos/Pos
USER23	1024*768@120Hz	Separate	Pos/Pos
USER24	800*600@160Hz	Separate	Pos/Pos

※1 Please use the like following when fH can not be produced in circumstances of the signal generator and near value is used. As for 31 kHz sides, use a signal of the highest cycle by $f_H \leq 31.0$kHz. As for 110kHz sides, use a signal of the lowest cycle by $f_H \geq 110$ kHz. (An error is 50Hz or less)

※2 Please supply the sync signal which is output from the signal generator to following.

H/V COMPOSITE SIGNAL : To the set.

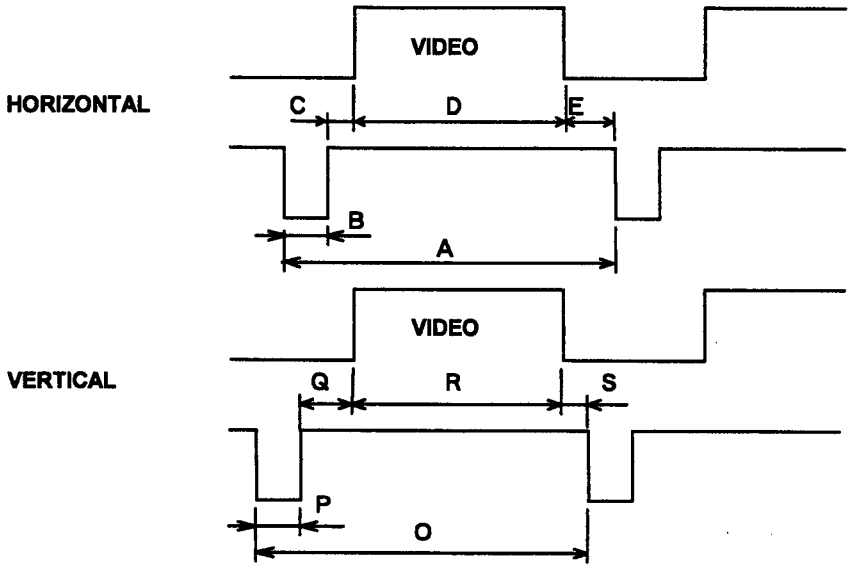
V.SYNC SIGNAL ONLY : To the color analyzer CA-100.

※3 Cross hatch pattern consist of the 17 vertical line and the 13 horizontal line.

2. Timing of Adjustment Signal

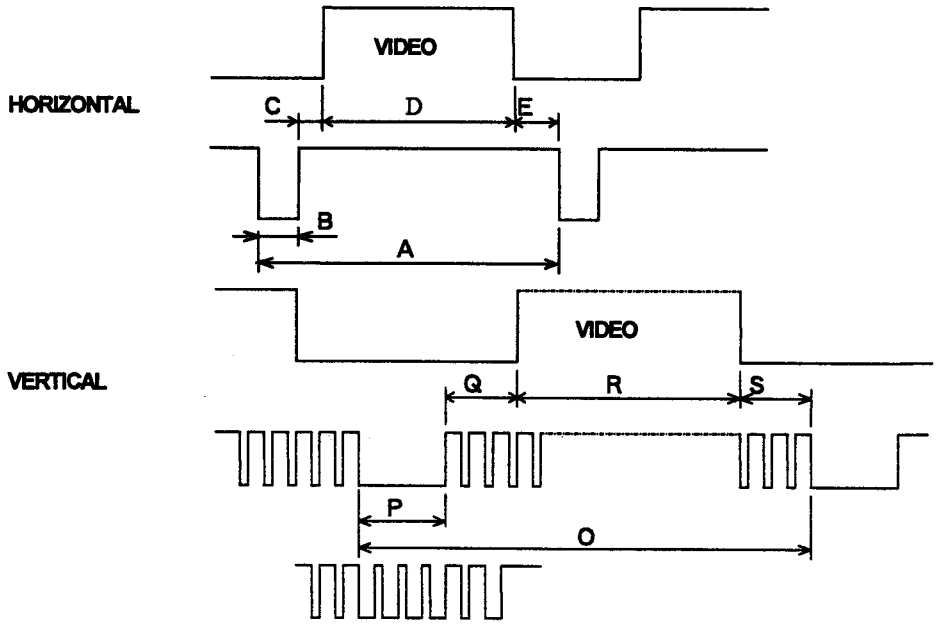
Signal Timing Charts

SEPARATE SYNC



Sync Polarity : Positive/Negative

COMPOSITE SYNC



Sync Polarity : Positive/Negative

TIMING NAME	1 VGA 350		2 VGA 400		3 VGA 480		4 800*600@60Hz		5 MAC 640*480	
Pixel Clock		25.175 [MHz]		25.175 [MHz]		25.175 [MHz]		40.000 [MHz]		30.240 [MHz]
H.Frequency		31.469 [kHz]		31.469 [kHz]		31.469 [kHz]		37.879 [kHz]		35.000 [kHz]
V.Frequency		70.086 [Hz]		70.086 [Hz]		59.940 [Hz]		60.317 [Hz]		66.667 [Hz]
H.Tortal Time	800 [dots]	31.778 [us]	800 [dots]	31.778 [us]	800 [dots]	31.778 [us]	1056 [dots]	26.400 [us]	864 [dots]	28.571 [us]
H.Addr Time	640 [dots]	25.422 [us]	640 [dots]	25.422 [us]	640 [dots]	25.422 [us]	800 [dots]	20.000 [us]	640 [dots]	21.164 [us]
H.Blank Time	160 [dots]	6.356 [us]	160 [dots]	6.356 [us]	160 [dots]	6.356 [us]	256 [dots]	6.400 [us]	224 [dots]	7.407 [us]
H.Front Porch	16 [dots]	0.636 [us]	16 [dots]	0.636 [us]	16 [dots]	0.636 [us]	40 [dots]	1.000 [us]	64 [dots]	2.116 [us]
H.Sync Time	96 [dots]	3.813 [us]	96 [dots]	3.813 [us]	96 [dots]	3.813 [us]	128 [dots]	3.200 [us]	64 [dots]	2.116 [us]
H.Back Porch	48 [dots]	1.907 [us]	48 [dots]	1.907 [us]	48 [dots]	1.907 [us]	88 [dots]	2.200 [us]	96 [dots]	3.175 [us]
V.Tortal Time	449 [lines]	14.268 [ms]	449 [lines]	14.268 [ms]	525 [lines]	16.683 [ms]	628 [lines]	16.579 [ms]	525 [lines]	15.000 [ms]
V.Addr Time	350 [lines]	11.122 [ms]	400 [lines]	12.711 [ms]	480 [lines]	15.253 [ms]	600 [lines]	15.840 [ms]	480 [lines]	13.714 [ms]
V.Blank Time	99 [lines]	3.146 [ms]	49 [lines]	1.557 [ms]	45 [lines]	1.430 [ms]	28 [lines]	0.739 [ms]	45 [lines]	1.286 [ms]
V.Front Porch	37 [lines]	1.176 [ms]	12 [lines]	0.381 [ms]	10 [lines]	0.318 [ms]	1 [lines]	0.026 [ms]	3 [lines]	0.086 [ms]
V.Sync Time	2 [lines]	0.064 [ms]	2 [lines]	0.064 [ms]	2 [lines]	0.064 [ms]	4 [lines]	0.106 [ms]	3 [lines]	0.086 [ms]
V.Back Porch	60 [lines]	1.907 [ms]	35 [lines]	1.112 [ms]	33 [lines]	1.049 [ms]	23 [lines]	0.607 [ms]	39 [lines]	1.114 [ms]
Scan Type	Non-Interlaced		Non-Interlaced		Non-Interlaced		Non-Interlaced		Non-Interlaced	
H.Sync Polarity	Positive		Negative		Negative		Positive		Negative	
V.Sync Polarity	Negative		Positive		Negative		Positive		Negative	
	Separate		Separate		Separate		Separate		Composite + Sync On G	

TIMING NAME	6 VESA 350@85Hz		7 VESA 400@85Hz		8 VESA 640*480@75Hz		9 XGA		10 VESA 800*600@75Hz	
Pixel Clock		31.500 [MHz]		31.500 [MHz]		31.500 [MHz]		44.900 [MHz]		49.500 [MHz]
H.Frequency		37.861 [kHz]		37.861 [kHz]		37.500 [kHz]		35.522 [kHz]		46.875 [kHz]
V.Frequency		85.080 [Hz]		85.080 [Hz]		75.000 [Hz]		87.064 [Hz]		75.000 [Hz]
H.Tortal Time	832 [dots]	26.413 [us]	832 [dots]	26.413 [us]	840 [dots]	26.667 [us]	1264 [dots]	28.151 [us]	1056 [dots]	21.333 [us]
H.Addr Time	640 [dots]	20.317 [us]	640 [dots]	20.317 [us]	640 [dots]	20.317 [us]	1024 [dots]	22.806 [us]	800 [dots]	16.162 [us]
H.Blank Time	192 [dots]	6.095 [us]	192 [dots]	6.095 [us]	200 [dots]	6.349 [us]	240 [dots]	5.345 [us]	256 [dots]	5.172 [us]
H.Front Porch	32 [dots]	1.016 [us]	32 [dots]	1.016 [us]	16 [dots]	0.508 [us]	8 [dots]	0.178 [us]	16 [dots]	0.323 [us]
H.Sync Time	32 [dots]	1.016 [us]	32 [dots]	1.016 [us]	64 [dots]	2.032 [us]	176 [dots]	3.920 [us]	80 [dots]	1.616 [us]
H.Back Porch	128 [dots]	4.063 [us]	128 [dots]	4.063 [us]	120 [dots]	3.810 [us]	56 [dots]	1.247 [us]	160 [dots]	3.232 [us]
V.Tortal Time	445 [lines]	11.754 [ms]	445 [lines]	11.754 [ms]	500 [lines]	13.333 [ms]	408 [lines]	11.486 [ms]	625 [lines]	13.333 [ms]
V.Addr Time	350 [lines]	9.244 [ms]	400 [lines]	10.565 [ms]	480 [lines]	12.800 [ms]	384 [lines]	10.810 [ms]	600 [lines]	12.800 [ms]
V.Blank Time	95 [lines]	2.509 [ms]	45 [lines]	1.189 [ms]	20 [lines]	0.533 [ms]	24 [lines]	0.676 [ms]	25 [lines]	0.533 [ms]
V.Front Porch	32 [lines]	0.845 [ms]	1 [lines]	0.026 [ms]	1 [lines]	0.027 [ms]	0 [lines]	0.000 [ms]	1 [lines]	0.021 [ms]
V.Sync Time	3 [lines]	0.079 [ms]	3 [lines]	0.079 [ms]	3 [lines]	0.080 [ms]	4 [lines]	0.113 [ms]	3 [lines]	0.064 [ms]
V.Back Porch	60 [lines]	1.585 [ms]	41 [lines]	1.083 [ms]	16 [lines]	0.427 [ms]	20 [lines]	0.563 [ms]	21 [lines]	0.448 [ms]
Scan Type	Non-Interlaced		Non-Interlaced		Non-Interlaced		Interlaced		Non-Interlaced	
H.Sync Polarity	Positive		Negative		Negative		Positive		Positive	
V.Sync Polarity	Negative		Positive		Negative		Positive		Positive	
	Separate		Separate		Separate		Separate		Separate	

TIMING NAME	11 VESA 640*480@85Hz		12 MAC 832*624		13 800*600@85Hz		14 1024*768@70Hz		15 1024*768@75Hz	
Pixel Clock		36.000 [MHz]		57.283 [MHz]		56.250 [MHz]		75.000 [MHz]		78.750 [MHz]
H.Frequency		43.269 [kHz]		49.725 [kHz]		53.674 [kHz]		56.476 [kHz]		60.023 [kHz]
V.Frequency		85.008 [Hz]		74.550 [Hz]		85.061 [Hz]		70.069 [Hz]		75.029 [Hz]
H.Tortal Time	832 [dots]	23.111 [us]	1152 [dots]	20.111 [us]	1048 [dots]	18.631 [us]	1328 [dots]	17.707 [us]	1312 [dots]	16.660 [us]
H.Addr Time	640 [dots]	17.778 [us]	832 [dots]	14.524 [us]	800 [dots]	14.222 [us]	1024 [dots]	13.653 [us]	1024 [dots]	13.003 [us]
H.Blank Time	192 [dots]	5.333 [us]	320 [dots]	5.586 [us]	248 [dots]	4.409 [us]	304 [dots]	4.053 [us]	288 [dots]	3.657 [us]
H.Front Porch	56 [dots]	1.556 [us]	32 [dots]	0.559 [us]	32 [dots]	0.569 [us]	24 [dots]	0.320 [us]	16 [dots]	0.203 [us]
H.Sync Time	56 [dots]	1.556 [us]	64 [dots]	1.117 [us]	64 [dots]	1.138 [us]	136 [dots]	1.813 [us]	96 [dots]	1.219 [us]
H.Back Porch	80 [dots]	2.222 [us]	224 [dots]	3.910 [us]	152 [dots]	2.702 [us]	144 [dots]	1.920 [us]	176 [dots]	2.235 [us]
V.Tortal Time	509 [lines]	11.764 [ms]	667 [lines]	13.414 [ms]	631 [lines]	11.756 [ms]	806 [lines]	14.272 [ms]	800 [lines]	13.328 [ms]
V.Addr Time	480 [lines]	11.093 [ms]	624 [lines]	12.549 [ms]	600 [lines]	11.179 [ms]	768 [lines]	13.599 [ms]	768 [lines]	12.795 [ms]
V.Blank Time	29 [lines]	0.670 [ms]	43 [lines]	0.865 [ms]	31 [lines]	0.578 [ms]	38 [lines]	0.673 [ms]	32 [lines]	0.533 [ms]
V.Front Porch	1 [lines]	0.023 [ms]	1 [lines]	0.020 [ms]	1 [lines]	0.019 [ms]	3 [lines]	0.053 [ms]	1 [lines]	0.017 [ms]
V.Sync Time	3 [lines]	0.069 [ms]	3 [lines]	0.060 [ms]	3 [lines]	0.056 [ms]	6 [lines]	0.106 [ms]	3 [lines]	0.050 [ms]
V.Back Porch	25 [lines]	0.578 [ms]	39 [lines]	0.784 [ms]	27 [lines]	0.503 [ms]	29 [lines]	0.513 [ms]	28 [lines]	0.466 [ms]
Scan Type		Non-Interlaced		Non-Interlaced		Non-Interlaced		Non-Interlaced		Non-Interlaced
H.Sync Polarity		Negative		Negative		Positive		Negative		Positive
V.Sync Polarity		Negative		Negative		Positive		Negative		Positive
		Separate		Composite + Sync On G		Separate		Separate		Separate

TIMING NAME	16 1280*1024@60Hz		17 MAC 1152*870		18 1024*768@85Hz		19 1280*1024@70Hz		20 1280*1024@75Hz	
Pixel Clock		108.000 [MHz]		100.000 [MHz]		94.500 [MHz]		127.000 [MHz]		135.000 [MHz]
H.Frequency		63.981 [kHz]		68.681 [kHz]		68.677 [kHz]		74.910 [kHz]		79.976 [kHz]
V.Frequency		60.020 [Hz]		75.062 [Hz]		84.997 [Hz]		69.880 [Hz]		75.025 [Hz]
H.Tortal Time	1688 [dots]	15.630 [us]	1456 [dots]	14.560 [us]	1376 [dots]	14.561 [us]	1696 [dots]	13.350 [us]	1688 [dots]	12.504 [us]
H.Addr Time	1280 [dots]	11.852 [us]	1152 [dots]	11.520 [us]	1024 [dots]	10.836 [us]	1280 [dots]	10.080 [us]	1280 [dots]	9.481 [us]
H.Blank Time	408 [dots]	3.778 [us]	304 [dots]	3.040 [us]	352 [dots]	3.725 [us]	416 [dots]	3.270 [us]	408 [dots]	3.022 [us]
H.Front Porch	48 [dots]	0.444 [us]	32 [dots]	0.320 [us]	48 [dots]	0.508 [us]	32 [dots]	0.250 [us]	16 [dots]	0.119 [us]
H.Sync Time	112 [dots]	1.037 [us]	128 [dots]	1.280 [us]	96 [dots]	1.016 [us]	160 [dots]	1.260 [us]	144 [dots]	1.067 [us]
H.Back Porch	248 [dots]	2.296 [us]	144 [dots]	1.440 [us]	208 [dots]	2.201 [us]	224 [dots]	1.760 [us]	248 [dots]	1.837 [us]
V.Tortal Time	1066 [lines]	16.661 [ms]	915 [lines]	13.322 [ms]	808 [lines]	11.765 [ms]	1072 [lines]	14.310 [ms]	1066 [lines]	13.329 [ms]
V.Addr Time	1024 [lines]	16.005 [ms]	870 [lines]	12.667 [ms]	768 [lines]	11.183 [ms]	1024 [lines]	13.670 [ms]	1024 [lines]	12.804 [ms]
V.Blank Time	42 [lines]	0.656 [ms]	45 [lines]	0.655 [ms]	40 [lines]	0.582 [ms]	48 [lines]	0.640 [ms]	42 [lines]	0.525 [ms]
V.Front Porch	1 [lines]	0.016 [ms]	3 [lines]	0.044 [ms]	1 [lines]	0.015 [ms]	2 [lines]	0.026 [ms]	1 [lines]	0.013 [ms]
V.Sync Time	3 [lines]	0.047 [ms]	3 [lines]	0.044 [ms]	3 [lines]	0.044 [ms]	4 [lines]	0.053 [ms]	3 [lines]	0.038 [ms]
V.Back Porch	38 [lines]	0.594 [ms]	39 [lines]	0.568 [ms]	36 [lines]	0.524 [ms]	42 [lines]	0.561 [ms]	38 [lines]	0.475 [ms]
Scan Type		Non-Interlaced		Non-Interlaced		Non-Interlaced		Non-Interlaced		Non-Interlaced
H.Sync Polarity		Positive		Negative		Positive		Negative		Positive
V.Sync Polarity		Positive		Negative		Positive		Nagative		Positive
		Separate		Composite + Sync On G		Separate		Sync on G		Separate

TIMING NAME	21 1600*1200@75Hz		22 H.HOLD1		23 H.MAX		24 MAC-832(Window)		25 V.MAX	
Pixel Clock		202.500 [MHz]		27.900 [MHz]		30.240 [MHz]		57.283 [MHz]		84.500 [MHz]
H.Frequency		93.750 [kHz]		31.000 [kHz]		35.000 [kHz]		49.720 [kHz]		65.000 [kHz]
V.Frequency		75.000 [Hz]		54.963 [Hz]		66.667 [Hz]		74.550 [Hz]		80.65 [Hz]
H.Tortal Time	2160 [dots]	10.667 [us]	900 [dots]	32.260 [us]	864 [dots]	28.571 [us]	1152 [dots]	20.110 [us]	1300 [dots]	15.38 [us]
H.Addr Time	1600 [dots]	7.901 [us]	720 [dots]	25.810 [us]	608 [dots]	20.106 [us]	241 [dots]	4.207 [us]	1024 [dots]	12.12 [us]
H.Blank Time	560 [dots]	2.765 [us]	180 [dots]	6.450 [us]	256 [dots]	8.465 [us]	911 [dots]	15.903 [us]	276 [dots]	3.26 [us]
H.Front Porch	64 [dots]	0.316 [us]	18 [dots]	0.640 [us]	80 [dots]	2.645 [us]	327 [dots]	5.708 [us]	24 [dots]	0.28 [us]
H.Sync Time	192 [dots]	0.948 [us]	108 [dots]	3.870 [us]	64 [dots]	2.116 [us]	64 [dots]	1.117 [us]	92 [dots]	1.09 [us]
H.Back Porch	304 [dots]	1.501 [us]	54 [dots]	1.940 [us]	112 [dots]	3.704 [us]	520 [dots]	9.078 [us]	160 [dots]	1.89 [us]
V.Tortal Time	1250 [lines]	13.333 [ms]	564 [lines]	18.194 [ms]	525 [lines]	15.000 [ms]	667 [lines]	13.414 [ms]	806 [lines]	12.4 [ms]
V.Addr Time	1200 [lines]	12.800 [ms]	428 [lines]	13.807 [ms]	480 [lines]	13.714 [ms]	221 [lines]	4.444 [ms]	596 [lines]	9.169 [ms]
V.Blank Time	50 [lines]	0.533 [ms]	136 [lines]	4.387 [ms]	45 [lines]	1.286 [ms]	446 [lines]	8.970 [ms]	210 [lines]	3.231 [ms]
V.Front Porch	1 [lines]	0.011 [ms]	52 [lines]	1.677 [ms]	3 [lines]	0.086 [ms]	203 [lines]	4.083 [ms]	89 [lines]	1.343 [ms]
V.Sync Time	3 [lines]	0.032 [ms]	2 [lines]	0.065 [ms]	3 [lines]	0.086 [ms]	3 [lines]	0.060 [ms]	6 [lines]	0.092 [ms]
V.Back Porch	46 [lines]	0.491 [ms]	82 [lines]	2.645 [ms]	39 [lines]	1.114 [ms]	240 [lines]	4.827 [ms]	115 [lines]	1.796 [ms]
Scan Type		Non-Interlaced		Non-interlaced		Non-interlaced		Non-interlaced		Non-interlaced
H.Sync Polarity		Positive		Positive		Negative		Negative		Negative
V.Sync Polarity		Positive		Positive		Negative		Negative		Negative
		Separate		Composite		Separate		Sync on G		Separate

TIMING NAME	27 EDID		28 1280*1024@74Hz		29 VESA 1600*1200@85Hz		31 600*400@70 Hz		35 VESA 1600*1200@60Hz	
Pixel Clock		28.322 [MHz]		135.000 [MHz]		229.500 [MHz]		25.175 [MHz]		162.000 [MHz]
H.Frequency		31.463 [kHz]		78.860 [kHz]		106.250 [kHz]		31.469 [kHz]		75.000 [kHz]
V.Frequency		42.01 [Hz]		74.120 [Hz]		85.000 [Hz]		70.086 [Hz]		60.000 [Hz]
H.Tortal Time	900 [dots]	31.777 [us]	1712 [dots]	12.680 [us]	2160 [dots]	9.412 [us]	800 [dots]	31.778 [us]	2160 [dots]	13.333 [us]
H.Addr Time	720 [dots]	25.422 [us]	1280 [dots]	9.480 [us]	1600 [dots]	6.972 [us]	640 [dots]	25.422 [us]	1600 [dots]	9.877 [us]
H.Blank Time	180 [dots]	6.36 [us]	432 [dots]	3.200 [us]	560 [dots]	2.440 [us]	160 [dots]	6.356 [us]	560 [dots]	3.457 [us]
H.Front Porch	18 [dots]	0.636 [us]	32 [dots]	0.230 [us]	64 [dots]	0.279 [us]	17 [dots]	0.675 [us]	64 [dots]	0.395 [us]
H.Sync Time	108 [dots]	3.813 [us]	144 [dots]	1.070 [us]	192 [dots]	0.837 [us]	64 [dots]	2.542 [us]	192 [dots]	1.185 [us]
H.Back Porch	54 [dots]	1.907 [us]	256 [dots]	1.900 [us]	304 [dots]	1.325 [us]	79 [dots]	3.138 [us]	304 [dots]	1.877 [us]
V.Tortal Time	749 [lines]	23.8 [ms]	1064 [lines]	13.491 [ms]	1250 [lines]	11.765 [ms]	449 [lines]	14.268 [ms]	1250 [lines]	16.667 [ms]
V.Addr Time	685 [lines]	21.767 [ms]	1024 [lines]	12.984 [ms]	1200 [lines]	11.294 [ms]	400 [lines]	12.711 [ms]	1200 [lines]	16.000 [ms]
V.Blank Time	64 [lines]	2.034 [ms]	40 [lines]	0.507 [ms]	50 [lines]	0.471 [ms]	49 [lines]	1.557 [ms]	50 [lines]	0.667 [ms]
V.Front Porch	14 [lines]	0.445 [ms]	11 [lines]	0.139 [ms]	1 [lines]	0.009 [ms]	13 [lines]	0.413 [ms]	1 [lines]	0.013 [ms]
V.Sync Time	3 [lines]	0.095 [ms]	3 [lines]	0.038 [ms]	3 [lines]	0.028 [ms]	2 [lines]	0.064 [ms]	3 [lines]	0.040 [ms]
V.Back Porch	47 [lines]	1.494 [ms]	26 [lines]	0.330 [ms]	46 [lines]	0.433 [ms]	34 [lines]	1.080 [ms]	46 [lines]	0.613 [ms]
Scan Type		Non-interlaced		Non-interlaced		Non-interlaced		Non-interlaced		Non-interlaced
H.Sync Polarity		Negative		Negative		Positive		Negative		Positive
V.Sync Polarity		Negative		Negative		Positive		Negative		Positive
		Separate		Separate		Separate		Separate		Separate

TIMING NAME	37 VESA 800*600@75Hz(window)		38 H.HOLD2 (110K)		39 788*1200@75		USER2 VESA 800*600@56Hz		USER3 VESA 1024*768@60Hz	
Pixel Clock		49.500 [MHz]		237.600 [MHz]		100.000 [MHz]		36.000 [MHz]		65.000 [MHz]
H.Frequency		46.875 [kHz]		110.000 [kHz]		93.720 [kHz]		35.156 [kHz]		48.363 [kHz]
V.Frequency		75.000 [Hz]		160.000 [Hz]		74.970 [Hz]		56.250 [Hz]		60.004 [Hz]
H.Tortal Time	1056 [dots]	21.330 [us]	2160 [dots]	9.091 [us]	1067 [dots]	10.670 [us]	1024 [dots]	28.444 [us]	1344 [dots]	20.677 [us]
H.Addr Time	240 [dots]	4.847 [us]	1600 [dots]	6.734 [us]	788 [dots]	7.890 [us]	800 [dots]	22.222 [us]	1024 [dots]	15.754 [us]
H.Blank Time	816 [dots]	16.481 [us]	560 [dots]	2.357 [us]	279 [dots]	2.780 [us]	224 [dots]	6.222 [us]	320 [dots]	4.923 [us]
H.Front Porch	296 [dots]	5.978 [us]	64 [dots]	0.269 [us]	34 [dots]	0.340 [us]	24 [dots]	0.667 [us]	24 [dots]	0.369 [us]
H.Sync Time	80 [dots]	1.616 [us]	192 [dots]	0.808 [us]	95 [dots]	0.950 [us]	72 [dots]	2.000 [us]	136 [dots]	2.092 [us]
H.Back Porch	440 [dots]	8.887 [us]	309 [dots]	1.280 [us]	150 [dots]	1.500 [us]	128 [dots]	3.556 [us]	160 [dots]	2.462 [us]
V.Tortal Time	625 [lines]	13.333 [ms]	687 [lines]	6.250 [ms]	1250 [lines]	13.338 [ms]	625 [lines]	17.778 [ms]	806 [lines]	16.666 [ms]
V.Addr Time	180 [lines]	3.839 [ms]	660 [lines]	6.000 [ms]	1200 [lines]	12.804 [ms]	600 [lines]	17.067 [ms]	768 [lines]	15.88 [ms]
V.Blank Time	444 [lines]	9.471 [ms]	27 [lines]	0.250 [ms]	50 [lines]	0.534 [ms]	25 [lines]	0.711 [ms]	38 [lines]	0.786 [ms]
V.Front Porch	210 [lines]	4.480 [ms]	1 [lines]	0.013 [ms]	1 [lines]	0.011 [ms]	1 [lines]	0.028 [ms]	3 [lines]	0.062 [ms]
V.Sync Time	3 [lines]	0.064 [ms]	4 [lines]	0.038 [ms]	3 [lines]	0.032 [ms]	2 [lines]	0.057 [ms]	6 [lines]	0.124 [ms]
V.Back Porch	231 [lines]	4.927 [ms]	22 [lines]	0.200 [ms]	46 [lines]	0.491 [ms]	22 [lines]	0.626 [ms]	29 [lines]	0.600 [ms]
Scan Type		Non-interlaced		Non-interlaced		Non-interlaced		Non-interlaced		Non-interlaced
H.Sync Polarity		Positive		Positive		Positive		Positive		Negative
V.Sync Polarity		Positive		Positive		Positive		Positive		Negative
		Separate		Separate		Separate		Separate		Separate

TIMING NAME	USER4 VESA 800*600@72Hz		USER5 1120*750@60Hz		USER6 640*480@100Hz		USER7 XGA2 1024*768@72Hz		USER8 1024*768@80Hz	
Pixel Clock		50.000 [MHz]		78.431 [MHz]		42.000 [MHz]		79.000 [MHz]		88.504 [MHz]
H.Frequency		48.077 [kHz]		50.020 [kHz]		50.000 [kHz]		58.088 [kHz]		64.320 [kHz]
V.Frequency		72.188 [Hz]		60.048 [Hz]		100.000 [Hz]		71.980 [Hz]		80.000 [Hz]
H.Tortal Time	1040 [dots]	20.800 [us]	1568 [dots]	19.992 [us]	840 [dots]	20.000 [us]	1360 [dots]	17.215 [us]	1376 [dots]	15.547 [us]
H.Addr Time	800 [dots]	16.000 [us]	1120 [dots]	14.280 [us]	640 [dots]	15.240 [us]	1024 [dots]	12.962 [us]	1024 [dots]	11.570 [us]
H.Blank Time	240 [dots]	4.800 [us]	448 [dots]	5.712 [us]	200 [dots]	4.760 [us]	336 [dots]	4.253 [us]	352 [dots]	3.977 [us]
H.Front Porch	56 [dots]	1.120 [us]	168 [dots]	2.142 [us]	16 [dots]	0.380 [us]	8 [dots]	0.101 [us]	64 [dots]	0.723 [us]
H.Sync Time	120 [dots]	2.400 [us]	112 [dots]	1.428 [us]	64 [dots]	1.520 [us]	288 [dots]	3.646 [us]	112 [dots]	1.265 [us]
H.Back Porch	64 [dots]	1.280 [us]	168 [dots]	2.142 [us]	120 [dots]	2.860 [us]	40 [dots]	0.506 [us]	176 [dots]	1.989 [us]
V.Tortal Time	666 [lines]	13.853 [ms]	833 [lines]	16.653 [ms]	500 [lines]	10.000 [ms]	807 [lines]	13.893 [ms]	804 [lines]	12.500 [ms]
V.Addr Time	600 [lines]	12.480 [ms]	750 [lines]	14.994 [ms]	480 [lines]	9.600 [ms]	768 [lines]	13.221 [ms]	768 [lines]	11.940 [ms]
V.Blank Time	66 [lines]	1.373 [ms]	83 [lines]	1.659 [ms]	20 [lines]	0.400 [ms]	39 [lines]	0.671 [ms]	36 [lines]	0.560 [ms]
V.Front Porch	37 [lines]	0.770 [ms]	27 [lines]	0.540 [ms]	1 [lines]	0.020 [ms]	0 [lines]	0.000 [ms]	1 [lines]	0.016 [ms]
V.Sync Time	6 [lines]	0.125 [ms]	10 [lines]	0.200 [ms]	3 [lines]	0.060 [ms]	8 [lines]	0.138 [ms]	3 [lines]	0.047 [ms]
V.Back Porch	23 [lines]	0.478 [ms]	46 [lines]	0.920 [ms]	16 [lines]	0.320 [ms]	31 [lines]	0.534 [ms]	32 [lines]	0.498 [ms]
Scan Type		Non-interlaced		Non-interlaced		Non-interlaced		Non-interlaced		Non-interlaced
H.Sync Polarity		Positive		Negative		Negative		Negative		Positive
V.Sync Polarity		Positive		Negative		Negative		Negative		Positive
		Separate		Separate		Separate		Separate		Separate

TIMING NAME	USER9 800*600@100Hz		USER10 640*480@120Hz		USER11 640*480@140Hz		USER12 VESA 1600*1200@60Hz		USER13 VESA1152*864@85Hz	
Pixel Clock		68.179 [MHz]		50.400 [MHz]		58.800 [MHz]		162.000 [MHz]		121.500 [MHz]
H.Frequency		63.600 [kHz]		59.990 [kHz]		70.000 [kHz]		75.000 [kHz]		77.094 [kHz]
V.Frequency		100.000 [Hz]		119.980 [Hz]		140.000 [Hz]		60.000 [Hz]		84.999 [Hz]
H.Tortal Time	1072 [dots]	15.723 [us]	840 [dots]	16.669 [us]	840 [dots]	14.286 [us]	2160 [dots]	13.333 [us]	1576 [dots]	12.971 [us]
H.Addr Time	800 [dots]	11.734 [us]	640 [dots]	12.701 [us]	640 [dots]	10.884 [us]	1600 [dots]	9.877 [us]	1152 [dots]	9.481 [us]
H.Blank Time	272 [dots]	3.989 [us]	200 [dots]	3.969 [us]	200 [dots]	3.401 [us]	560 [dots]	3.457 [us]	424 [dots]	3.490 [us]
H.Front Porch	48 [dots]	0.704 [us]	16 [dots]	0.318 [us]	16 [dots]	0.272 [us]	64 [dots]	0.395 [us]	64 [dots]	0.527 [us]
H.Sync Time	88 [dots]	1.291 [us]	64 [dots]	1.270 [us]	64 [dots]	1.088 [us]	192 [dots]	1.185 [us]	128 [dots]	1.053 [us]
H.Back Porch	136 [dots]	1.995 [us]	120 [dots]	2.381 [us]	120 [dots]	2.041 [us]	304 [dots]	1.877 [us]	232 [dots]	1.909 [us]
V.Tortal Time	636 [lines]	10.000 [ms]	500 [lines]	8.335 [ms]	500 [lines]	7.143 [ms]	1250 [lines]	16.667 [ms]	907 [lines]	11.765 [ms]
V.Addr Time	600 [lines]	9.434 [ms]	480 [lines]	8.001 [ms]	480 [lines]	6.857 [ms]	1200 [lines]	16.000 [ms]	864 [lines]	11.207 [ms]
V.Blank Time	36 [lines]	0.566 [ms]	20 [lines]	0.334 [ms]	20 [lines]	0.286 [ms]	50 [lines]	0.667 [ms]	43 [lines]	0.558 [ms]
V.Front Porch	1 [lines]	0.016 [ms]	1 [lines]	0.017 [ms]	1 [lines]	0.014 [ms]	1 [lines]	0.013 [ms]	1 [lines]	0.013 [ms]
V.Sync Time	3 [lines]	0.047 [ms]	3 [lines]	0.050 [ms]	3 [lines]	0.043 [ms]	3 [lines]	0.040 [ms]	3 [lines]	0.039 [ms]
V.Back Porch	32 [lines]	0.503 [ms]	16 [lines]	0.267 [ms]	16 [lines]	0.229 [ms]	46 [lines]	0.613 [ms]	39 [lines]	0.506 [ms]
Scan Type		Non-interlaced		Non-interlaced		Non-interlaced		Non-Interlaced		Non-Interlaced
H.Sync Polarity		Positive		Negative		Negative		Positive		Positive
V.Sync Polarity		Positive		Negative		Negative		Positive		Positive
		Separate		Separate		Separate		Separate		Separate

TIMING NAME	USER14 1024*768@100Hz		USER15 800*600@120Hz		USER16 640*480@160Hz		USER17 1800*1440@60Hz		USER18 VESA 1600*1200@70Hz	
Pixel Clock		108.390 [MHz]		83.250 [MHz]		67.200 [MHz]		219.566 [MHz]		189.000 [MHz]
H.Frequency		80.647 [kHz]		78.835 [kHz]		80.000 [kHz]		98.400 [kHz]		87.500 [kHz]
V.Frequency		100.059 [Hz]		121.659 [Hz]		160.000 [Hz]		60.000 [Hz]		70.000 [Hz]
H.Tortal Time	1344 [dots]	12.400 [us]	1056 [dots]	12.685 [us]	840 [dots]	12.500 [us]	2456 [dots]	11.186 [us]	2160 [dots]	11.429 [us]
H.Addr Time	1024 [dots]	9.447 [us]	800 [dots]	9.610 [us]	640 [dots]	9.524 [us]	1800 [dots]	8.198 [us]	1600 [dots]	8.466 [us]
H.Blank Time	320 [dots]	2.952 [us]	256 [dots]	3.075 [us]	200 [dots]	2.976 [us]	656 [dots]	2.988 [us]	560 [dots]	2.963 [us]
H.Front Porch	24 [dots]	0.221 [us]	32 [dots]	0.384 [us]	16 [dots]	0.238 [us]	128 [dots]	0.583 [us]	64 [dots]	0.339 [us]
H.Sync Time	136 [dots]	1.255 [us]	80 [dots]	0.961 [us]	64 [dots]	0.952 [us]	200 [dots]	0.911 [us]	192 [dots]	1.016 [us]
H.Back Porch	160 [dots]	1.476 [us]	144 [dots]	1.730 [us]	120 [dots]	1.786 [us]	328 [dots]	1.494 [us]	304 [dots]	1.608 [us]
V.Tortal Time	806 [lines]	9.994 [ms]	648 [lines]	8.220 [ms]	500 [lines]	6.250 [ms]	1490 [lines]	16.667 [ms]	1250 [lines]	14.286 [ms]
V.Addr Time	768 [lines]	9.523 [ms]	600 [lines]	7.611 [ms]	480 [lines]	6.000 [ms]	1440 [lines]	16.107 [ms]	1200 [lines]	13.714 [ms]
V.Blank Time	38 [lines]	0.471 [ms]	48 [lines]	0.609 [ms]	20 [lines]	0.250 [ms]	50 [lines]	0.559 [ms]	50 [lines]	0.571 [ms]
V.Front Porch	3 [lines]	0.037 [ms]	2 [lines]	0.025 [ms]	1 [lines]	0.013 [ms]	1 [lines]	0.011 [ms]	1 [lines]	0.011 [ms]
V.Sync Time	6 [lines]	0.074 [ms]	4 [lines]	0.051 [ms]	3 [lines]	0.038 [ms]	3 [lines]	0.034 [ms]	3 [lines]	0.034 [ms]
V.Back Porch	29 [lines]	0.360 [ms]	42 [lines]	0.533 [ms]	16 [lines]	0.200 [ms]	46 [lines]	0.515 [ms]	46 [lines]	0.526 [ms]
Scan Type		Non-Interlaced		Non-interlaced		Non-Interlaced		Non-interlaced		Non-Interlaced
H.Sync Polarity		Positive		Positive		Negative		Positive		Positive
V.Sync Polarity		Positive		Positive		Negative		Positive		Positive
		Separate		Separate		Separate		Separate		Separate

TIMING NAME	USER19 VESA 1280*1024@85Hz		USER20 800*600@140Hz		USER21 1800*1440@70Hz		USER22 VESA 1600*1200@80Hz		USER23 1024*768@120Hz	
Pixel Clock		157.500 [MHz]		92.300 [MHz]		259.387 [MHz]		216.000 [MHz]		139.054 [MHz]
H.Frequency		91.146 [kHz]		87.488 [kHz]		104.930 [kHz]		100.000 [kHz]		98.760 [kHz]
V.Frequency		85.024 [Hz]		139.981 [Hz]		70.000 [Hz]		80.000 [Hz]		120.000 [Hz]
H.Tortal Time	1728 [dots]	10.971 [us]	1055 [dots]	11.430 [us]	2472 [dots]	9.530 [us]	2160 [dots]	10.000 [us]	1408 [dots]	10.126 [us]
H.Addr Time	1280 [dots]	8.127 [us]	799 [dots]	8.657 [us]	1800 [dots]	6.939 [us]	1600 [dots]	7.407 [us]	1024 [dots]	7.364 [us]
H.Blank Time	448 [dots]	2.844 [us]	256 [dots]	2.774 [us]	672 [dots]	2.591 [us]	560 [dots]	2.593 [us]	384 [dots]	2.762 [us]
H.Front Porch	64 [dots]	0.406 [us]	16 [dots]	0.173 [us]	136 [dots]	0.524 [us]	64 [dots]	0.296 [us]	80 [dots]	0.575 [us]
H.Sync Time	160 [dots]	1.016 [us]	80 [dots]	0.867 [us]	200 [dots]	0.771 [us]	192 [dots]	0.889 [us]	112 [dots]	0.805 [us]
H.Back Porch	224 [dots]	1.422 [us]	160 [dots]	1.733 [us]	336 [dots]	1.295 [us]	304 [dots]	1.407 [us]	192 [dots]	1.381 [us]
V.Tortal Time	1072 [lines]	11.761 [ms]	625 [lines]	7.144 [ms]	1499 [lines]	14.286 [ms]	1250 [lines]	12.500 [ms]	823 [lines]	8.333 [ms]
V.Addr Time	1024 [lines]	11.235 [ms]	600 [lines]	6.858 [ms]	1440 [lines]	13.723 [ms]	1200 [lines]	12.000 [ms]	768 [lines]	7.776 [ms]
V.Blank Time	48 [lines]	0.527 [ms]	25 [lines]	0.286 [ms]	59 [lines]	0.562 [ms]	50 [lines]	0.500 [ms]	55 [lines]	0.557 [ms]
V.Front Porch	1 [lines]	0.011 [ms]	1 [lines]	0.011 [ms]	1 [lines]	0.010 [ms]	1 [lines]	0.010 [ms]	1 [lines]	0.010 [ms]
V.Sync Time	3 [lines]	0.033 [ms]	3 [lines]	0.034 [ms]	3 [lines]	0.029 [ms]	3 [lines]	0.030 [ms]	3 [lines]	0.030 [ms]
V.Back Porch	44 [lines]	0.483 [ms]	21 [lines]	0.240 [ms]	55 [lines]	0.524 [ms]	46 [lines]	0.460 [ms]	51 [lines]	0.516 [ms]
Scan Type		Non-Interlaced		Non-Interlaced		Non-Interlaced		Non-Interlaced		Non-Interlaced
H.Sync Polarity		Positive		Positive		Positive		Positive		Positive
V.Sync Polarity		Positive		Positive		Positive		Positive		Positive
		Separate		Separate		Separate		Separate		Separate

TIMING NAME	USER24 800*600@160Hz									
Pixel Clock		116.406 [MHz]		[MHz]		[MHz]		[MHz]		[MHz]
H.Frequency		105.440 [kHz]		[kHz]		[kHz]		[kHz]		[kHz]
V.Frequency		160 [Hz]		[Hz]		[Hz]		[Hz]		[Hz]
H.Tortal Time	1104 [dots]	9.484 [us]	[dots]	[us]	[dots]	[us]	[dots]	[us]	[dots]	[us]
H.Addr Time	800 [dots]	6.873 [us]	[dots]	[us]	[dots]	[us]	[dots]	[us]	[dots]	[us]
H.Blank Time	304 [dots]	2.612 [us]	[dots]	[us]	[dots]	[us]	[dots]	[us]	[dots]	[us]
H.Front Porch	64 [dots]	0.550 [us]	[dots]	[us]	[dots]	[us]	[dots]	[us]	[dots]	[us]
H.Sync Time	88 [dots]	0.765 [us]	[dots]	[us]	[dots]	[us]	[dots]	[us]	[dots]	[us]
H.Back Porch	152 [dots]	1.306 [us]	[dots]	[us]	[dots]	[us]	[dots]	[us]	[dots]	[us]
V.Tortal Time	659 [lines]	6.250 [ms]	[lines]	[ms]	[lines]	[ms]	[lines]	[ms]	[lines]	[ms]
V.Addr Time	600 [lines]	5.690 [ms]	[lines]	[ms]	[lines]	[ms]	[lines]	[ms]	[lines]	[ms]
V.Blank Time	59 [lines]	0.560 [ms]	[lines]	[ms]	[lines]	[ms]	[lines]	[ms]	[lines]	[ms]
V.Front Porch	1 [lines]	0.009 [ms]	[lines]	[ms]	[lines]	[ms]	[lines]	[ms]	[lines]	[ms]
V.Sync Time	3 [lines]	0.028 [ms]	[lines]	[ms]	[lines]	[ms]	[lines]	[ms]	[lines]	[ms]
V.Back Porch	55 [lines]	0.522 [ms]	[lines]	[ms]	[lines]	[ms]	[lines]	[ms]	[lines]	[ms]
Scan Type		Non-Interlaced								
H.Sync Polarity		Positive								
V.Sync Polarity		Positive								
		Separate								

NOTE) Use special signals when original signals can not be made by equipped signal generator.
Don't use these signal timing for Focus Adjustment. (The resolution is different.)

			ORIGINAL	SPECIAL	ORIGINAL	SPECIAL	ORIGINAL	SPECIAL	ORIGINAL	SPECIAL	ORIGINAL	SPECIAL	ORIGINAL	SPECIAL
	PROGRAM NO.		16	16	17	17	18	18	19	19	20	20	21	21
	SIGNAL NAME		1280*1024 @60	-	MAC II 1152*870	-	1024*768 @85	-	1280*1024 @70	-	1280*1024 @75	-	1600*1200 @75	-
	RESOLUTION		1280*1024	-	1152*870	-	1024*768	-	1280*1024	-	1280*1024	-	1600*1200	-
	DOT CLOCK	(MHz)	108	**81**	100	**75**	94.5	**70.88**	127	**63.5**	135	**67.5**	202.5	**50.63**
	fh	(kHz)	63.98	63.98	68.681	68.681	68.68	68.68	74.882	74.882	79.975	79.975	93.75	93.75
	fv	(Hz)	60.02	60.02	75.062	75.062	85	85	69.853	69.853	75.025	75.025	75	75
HORIZONTAL	CELL SIZE	(DOT)	8	8	8	8	8	8	8	8	8	8	8	8
	TOTAL	(DOT)	1688	**1266**	1456	**1092**	1376	**1032**	1696	**848**	1688	**844**	2160	**540**
		(CHR)	211	**158**			172	**129**	212	**106**	211	**158**	270	**67**
		(uS)	15.63	15.63	14.56	14.56	14.56	14.56	13.354	13.354	12.504	12.504	10.667	10.667
	DISP	(DOT)	1280	**960**	1152	**864**	1024	**768**	1280	**640**	1280	**640**	1600	**400**
		(CHR)	160	**120**			128	**96**	160	**80**	160	**80**	200	**50**
		(uS)	11.85	11.85	11.52	11.52	10.84	10.84	10.079	10.079	9.481	9.481	7.901	7.901
	FRONT	(DOT)	48	**36**	32	**24**	48	**36**	32	**16**	16	**8**	64	**16**
		(uS)	0.44	0.44	0.32	0.32	0.51	0.51	0.252	0.252	0.119	0.119	0.316	0.316
	SYNC PULSE	(DOT)	112	**84**	128	**96**	96	**72**	160	**80**	144	**72**	192	**48**
		(uS)	1.04	1.04	1.28	1.28	1.02	1.02	1.26	1.26	1.067	1.067	0.948	0.948
	BACK	(DOT)	248	**186**	144	**108**	208	**156**	224	**112**	248	**124**	304	**76**
		(uS)	2.3	2.3	1.44	1.44	2.2	2.2	1.764	1.764	1.837	1.837	1.501	1.501
			ORIGINAL	SPECIAL	ORIGINAL	SPECIAL	ORIGINAL	SPECIAL	ORIGINAL	SPECIAL	ORIGINAL	SPECIAL		
	PROGRAM NO.		28	28	29	29	35	35	38	38	39	39		
	SIGNAL NAME		1280*1024 @74	-	1600*1200 @85	-	1600*1200 @60	-	H.HOLD2 (110K)	-	788*1200 @75			
	RESOLUTION		1280*1024	-	1600*1200	-	1600*1200	-		-		-		
	DOT CLOCK	(MHz)	135	**67.5**	229.5	**57.40**	162	**81**	237.6	**80.97**	100	**75**		
	fh	(kHz)	78.86	78.86	106.25	106.25	75	75	110	110	93.72	93.72		
	fv	(Hz)	74.12	74.12	85	85	60	60	160	160	74.97	74.79		
HORIZONTAL	CELL SIZE	(DOT)	8	8	8	8	8	8	8	8	8	8		
	TOTAL	(DOT)	1712	**856**	2160	**540**	2160	**1080**	2160	**736**	1067	**800**		
		(CHR)			270	**67**	270	**135**	270	**92**	133	**100**		
		(uS)	12.68	12.68	9.412	9.412	13.333	13.333		9.06		10.67		
	DISP	(DOT)	1280	**640**	1600	**400**	1600		1600	**544**	788	**592**		
		(CHR)	160	**80**	200	**50**	200	**100**	200	**68**		**74**		
		(uS)	9.48	9.48	6.972	6.972	9.877	9.877		6.73		7.89		
	FRONT	(DOT)	32	**16**	64	**16**	64	**32**	64	**21**	34	**26**		
		(uS)	0.23	0.23	0.279	0.279	0.395	0.395		0.22		0.34		
	SYNC PULSE	(DOT)	144	**72**	192	**48**	192	**96**	192	**66**	95	**70**		
		(uS)	1.07	1.07	0.837	0.837	1.185	1.185		0.81		0.94		
	BACK	(DOT)	256	**128**	304	**76**	304	**152**	309	**105**	150	**112**		
		(uS)	1.9	1.9	1.325	1.325	1.877	1.877		1.30		1.50		

3. Position of Connector / Test point of Adjustmnet

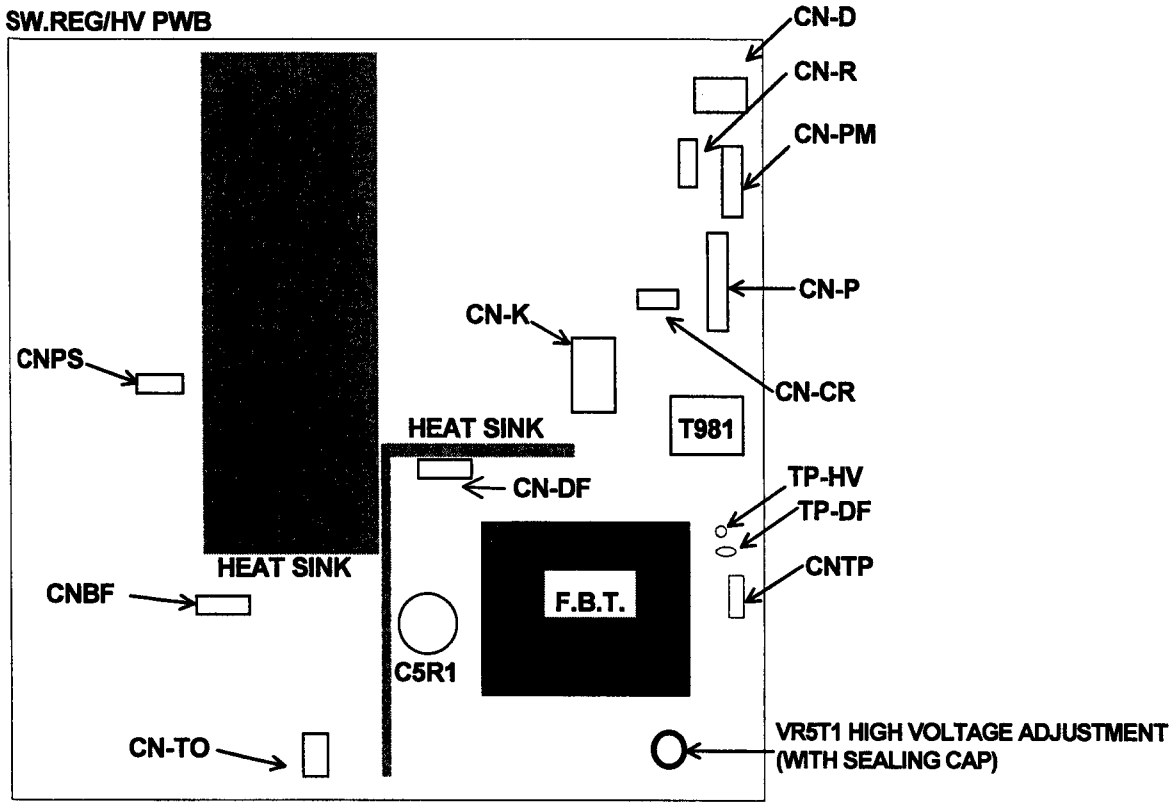


Fig 3-1 SW/HV PWB(PARTS SIDE)

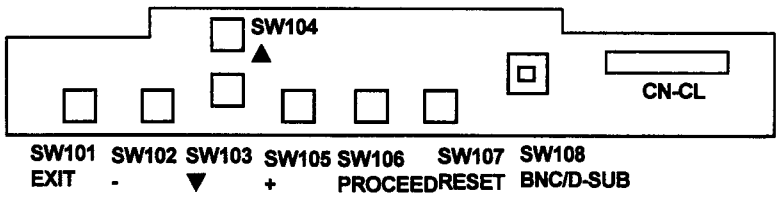


Fig 3-2 CONT PWB(PARTS SIDE)

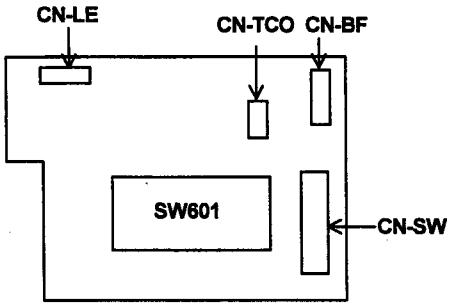


Fig 3-3 SW PWB(PARTS SIDE)

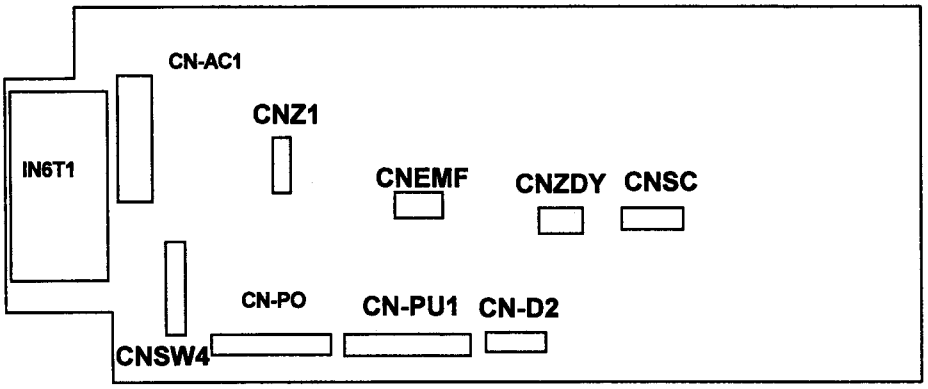


Fig 3-4 INLET PWB(PARTS SIDE)

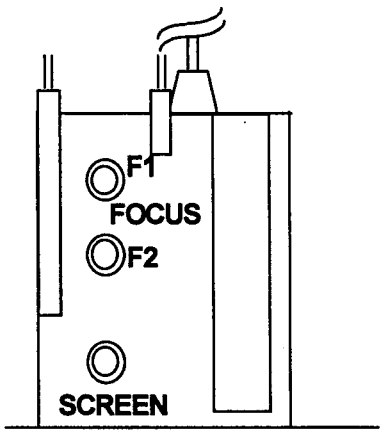


Fig 3-5 F.B.T. VR

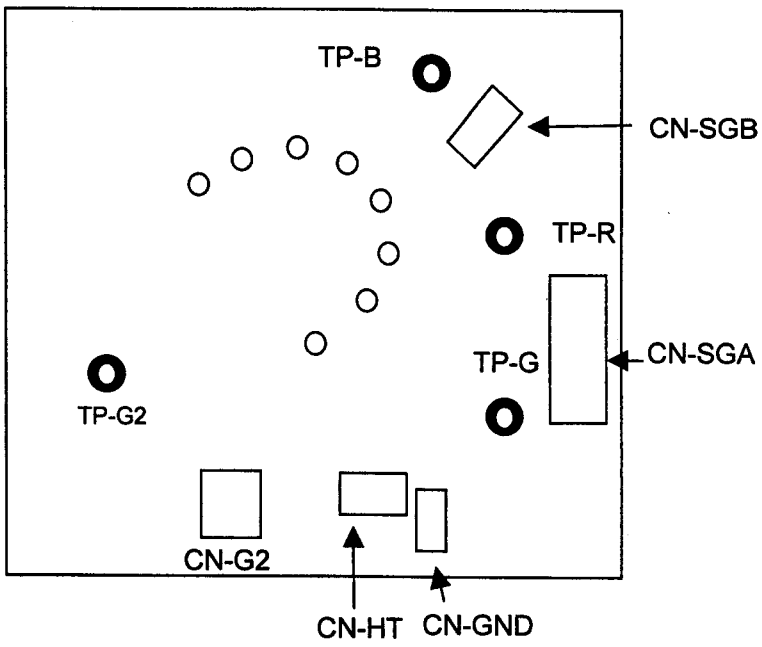


Fig 3-6 CRT PWB(PARTS SIDE)

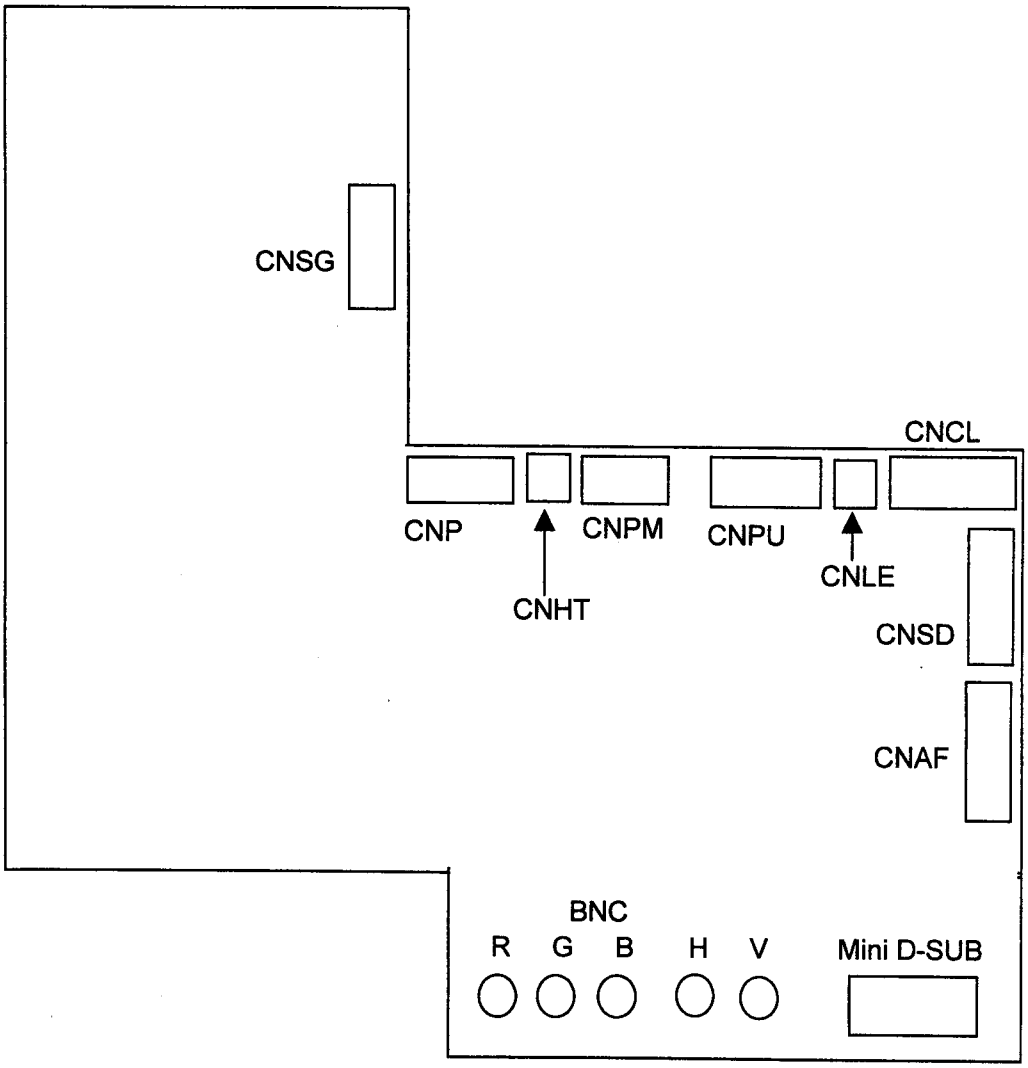


Fig 3-7 VIDEO PWB(PARTS SIDE)

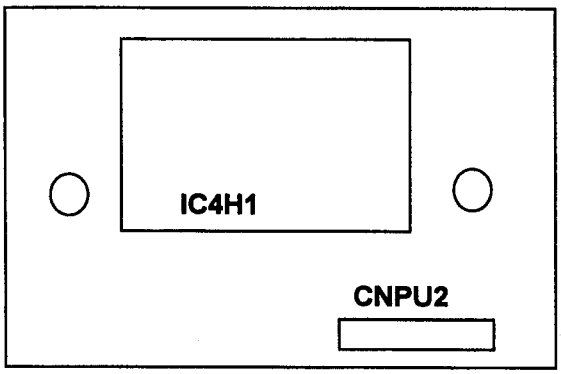


Fig 3-8 PU PWB(PARTS SIDE)

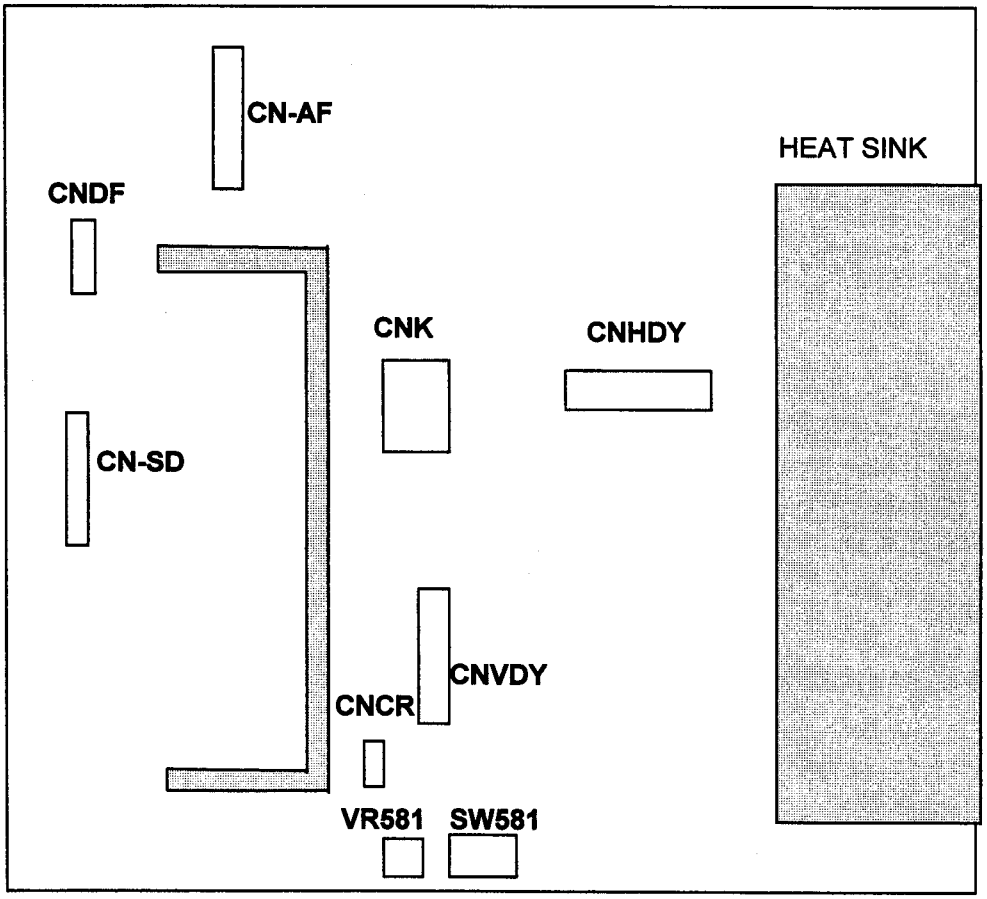


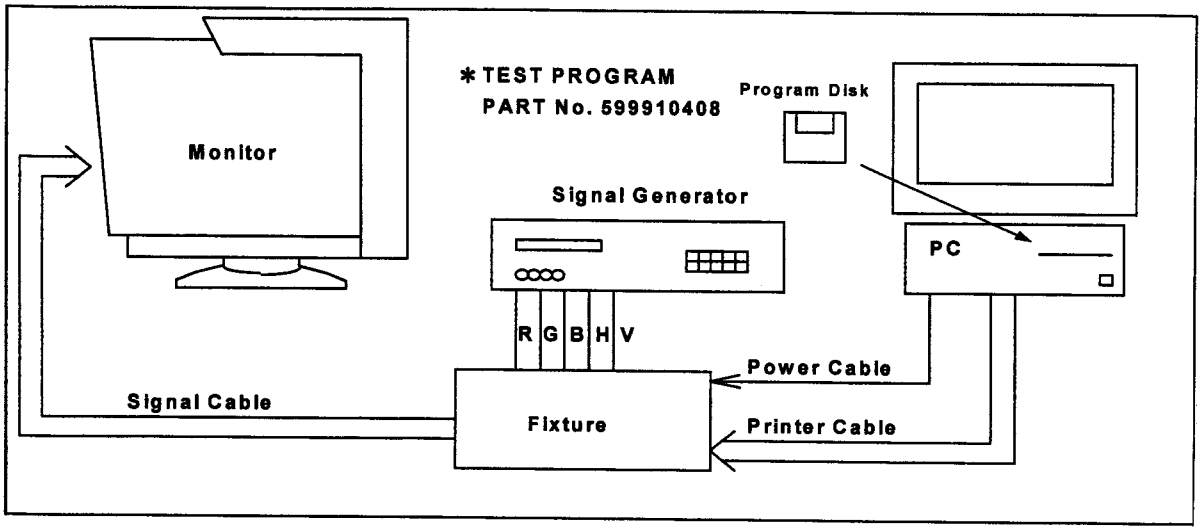
Fig 3-9 DEF PWB(PARTS SIDE)

INSPECTION

1. .Inspection of PLUG & PLAY communication

1-1. A construction of System

This system should be connected as shown below.



1-2. Starting method

1) Input Signal

Input signal must be separate sync. Two kinds of signals must be prepared.
One is the signal whose vertical synchronization frequency is 42Hz, and another is the signal whose vertical synchronization frequency is between 55Hz and 25kHz.
Horizontal synchronization frequency should be set to reasonable value(example 31.5kHz).

2) Power ON procedure

- First, put the floppy disk for PnP Inspection into PC and turn on PC.
- Turn on Fixture.
- Make sure that fixture's LED turns on and off.
- Turn on signal generator and monitor.

3) Starting PC Software

- Inspection of PnP communication
  To check the PnP communication, EDID file name is P1250+,
  set "PR P1250+" to DOS command line and press return key.
- Writing EDID to EEPROM and inspection of PnP communication
  To write EDID to EEPROM and check the PnP communication which its EDID file name is P1250+, type "WPR P1250+" on DOS prompt line and press return key.

1-3. Operation

- The operation should be performed according to the screen message.
- When the message of "Please set Vsync to 42Hz." is displayed, set the signal generator to the signal with vertical synchronization frequency of 42Hz. When the message of "Please set Vsync to over 55Hz." is displayed, set the signal generator to the signal whose vertical synchronization frequency is between 55Hz and 25kHz.
- The message of "Normally Complete" means that writing of EDID data or PnP inspection completed normally. The message of "Error" means that writing of EDID data or PnP inspection finished incorrectly.
- When the PnP inspection is completed, read EDID data would be displayed. And if the read EDID data differed from the original EDID data, the different bytes would be displayed in red.
- For the details of error, see the messages displayed at the bottom right of the screen. The meaning of the messages is shown on section 4.
- After writing of EDID data or inspection of DDC2B, monitor can not be communicated by DDC1. In that case, turn off and on the monitor again, which will make the DDC1 communication test possible.
- Make sure that fixture's LED flashes on and off before writing EDID data, inspecting DDC1 and DDC2B. If the fixture's LED does not flash on and off, turn off and turn on the monitor and the fixture.

1-4. Error Messages

- Start Bit Error
  This message is displayed when the start bit is not "H" while sending data from PC to MPU on the fixture. This error will be caused by noise etc. on the line.
- Command Error
  This message is displayed when the different command is sent from PC to MPU on the fixture.
- Hardware Error
  This message means that the PC does not recognize ACK command sent from the MPU on the fixture.
- File Open Error
  This message means that the input EDID file name was wrong.
- Command line Switch Error
  This message means that the input communication command is incorrect.
- Parity Error
  This message is displayed when the MPU on the fixture recognized the parity bit is incorrect. This error can be caused by noise etc. on the line.
- EDID Data Error
  This message is displayed when the null bit is not detected in EDID data read by DDC1 communication.
- EDID Data Sort Error
  This message is displayed when the header code is not detected in EDID data read by DDC1 communication.
- Time Out Error
  This message is displayed when the PC does not recognize ACK commands sent from MPU within 10 msec after the PC had sent communication command or EDID data.
  If this error occurs, check the connection on PC, fixture and monitor.

1-5. EDID data file

The EDID data file text is shown below. When you write or inspect EDID for this monitor, the following table can be used.

file name : P1250+

EDID-100

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
00	00	FF	FF	FF	FF	FF	FF	00	38	A3	E8	53	01	01	01	01
10	1B	08	01	01	0E	26	1D	78	E8	A0	B8	A2	54	4C	9B	26
20	10	48	4C	FF	FF	80	31	59	45	59	61	59	71	4F	81	59
30	81	99	A9	59	01	01	A6	59	40	30	62	B0	32	40	40	C0
40	13	00	80	20	11	00	00	1E	00	00	00	FD	00	37	A0	1F
50	6E	19	00	0A	20	20	20	20	20	20	00	00	00	FC	00	4E
60	45	43	20	50	31	32	35	30	2B	0A	20	20	00	00	00	FF
70	00	38	34	30	30	30	30	31	4B	41	0A	20	20	20	00	15

Table 1-5. Data list (Management number : EDID-100)

※1 : address 10h — Manufactured month x 4

※2 : address 11h — Manufactured year - 1990

※3 : address 71h ~ 7Dh — Input serial number (ASCII code)
Add 20th remaining address.

※4 : address 7Fh — Checksum. The sum of entire 128byte shall be equal to 00h.

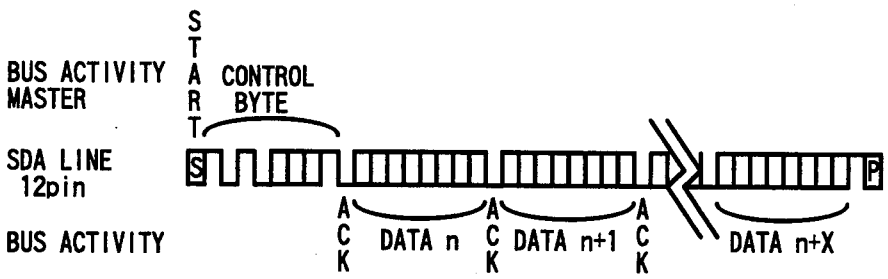


Diagram 1-5 Timing chart of DDC2B

2. CRT

[A] CRT face plate defect

1. Inspection condition

(1) In the operating condition, observe the defect on the screen under following condition :
9,300K (Δx=0.281, Δy=0.311)
white raster or the element monochrome raster which its brightness is 34cd/m^2 (10ft·L) on the screen center surrounding light is about 10 Lux

(2) In the non-operating condition, observe the defect of the screen under light of about 200 Lux.

(3) Inspection shall be made more than 60 cm away from the screen.

(4) Observe the screen on white raster and each monochrome color of red, green, and blue.

2. Division of zone

A screen is divided into following 2 zones.

zone A : Area inside the rectangle that its size measures H : 358 mm, V : 268 mm in the center of screen.

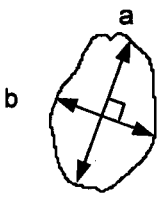
zone B : Area outside the above rectangle

3. Limits

3-1. CRT face defect

3-1-1. Distance (most short distance)

3-1-2. Average diagram



Turn of $\frac{a+b}{2}$ or $\frac{a}{20}+2b$ small value into an on the average diameter. (a: length, b: width)

3-1-3. Limit

· Black spot, missing spot

Average diameter(mm)	A	B	A + B	minimum distance
0.51 ~	0	0	0	-
0.31 ~ 0.50	4	4	6	30 mm
0.15 ~ 0.30	6 (note 1)	6 (note 1)	10 (note 1)	10 mm

· Discoloration, stain

Average diameter(mm)	A	B	A + B	minimum distance
0.51 ~ 0.75	0	1	-	20 mm
0.15 ~ 0.50	2	3	-	20 mm

Note 1 : No missing spot larger than specified are allowed in Zone A.

Note 2 : The spec applies to each color.

3-2. Face plate defect

3-2-1. Blisters, opaque spots and elongated closed blisters

Average diameter (mm) #1	Allowable number(pcs)			Minimum Separation (mm)
	Zone A	Zone B	Total	
0.76 ~	0	0	0	30
0.51 ~ 0.75	0	1	1	
0.26 ~ 0.50	2	3	5	
0.11 ~ 0.25	-	-	-	

#1: More than 5 detects shall not gather in a Φ10 circle.

3-2-2. Scratch

Width(mm)	Allowable Length(mm) (Zone A + Zone B)
0.16 ~	rejected
0.11 ~ 0.15	13
0.06 ~ 0.10	26
~ 0.05	unlimited

3-2-3. Other glass defects

Flaw, crack and lack cannot be distinguish easily by naked eye.

Iron rust conforms to limited sample.

[B] K coating's surface defect

1. Inspection condition

(1) Put a valve on an inspective stand and Illuminate it from the top with white fluorescent light.

(2) Valve surface illuminance is less than 1500Lux and more than 1000Lux.

(3) Observe from distance of 40cm from surface, disregard flaws which can not be distinguished from this distance.

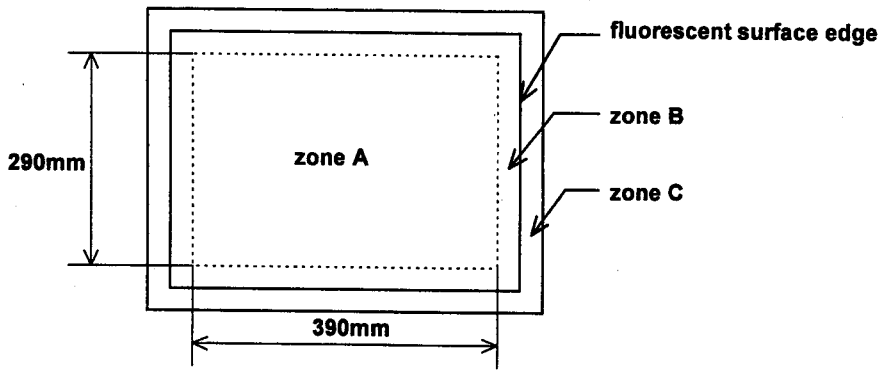
2. Division of zone

A screen is divided into following 3 zones.

zone A : Area inside the rectangle that measures H : 390 mm, V : 290 mm at the center of screen.

zone B : Area outside zone A and inside the fluorescent surface edge.

zone C : Area outside the fluorescent surface edge.



3. Limits

3-1. Scratch

Width(mm)	Allowable Length(mm)(Zone A + Zone B)
0.16 ~	reject
0.11 ~ 0.15	13
0.06 ~ 0.10	26
~ 0.05	unlimited

NOTE 1 : Even though width of scratch is more than 0.16mm, regard scratch whose contrast is weak extremely as stain and apply standard of 3.2.

NOTE 2 : Do not recognize flaws which injures goods prices though it is not especially stipulated as for zone C.

3-2. Opaque flaws (ex. Stain) and coating peeling

Do not apply the following standard to zone C.

Classify flaws by contrast and judge it by size every the contrast.

Definition of a contrast

High contrast : The foreign substance which shuts off light from fluorescence surface

Middle contrast : A semitransparent foreign substance and stain (ex. coating material which has been changed)

Low contrast : stain and dust which do not reflect light from fluorescence surface and can be distinguished by its appearance

Standard

average diameter classified by a contrast NOTE 4 (mm)			Allowable number		Allowable Length (mm) NOTE 3
High contrast	Middle contrast	Low contrast	zone A	zone B	
~ 0.10	~ 0.20	~ 0.50	Rejected	Rejected	-
0.11 ~ 0.25	0.21 ~ 0.50	0.51 ~ 1.25	2 [4]	4 [4]	20
0.26 ~ 0.50	0.51 ~ 1.00	1.26 ~ 2.50	1 [3]	2 [3]	40
0.51 ~ 0.75	1.01 ~ 1.50	2.51 ~ 3.75	0 [3]	1 [3]	80

NOTE 1 : A number inside brackets show allowable number of Low contrast. However, it is based on the following tables as for the total number of a low contrastive fault.

NOTE 2 : If a defect has different contrast's one in it, shall be judged by higher contrast's specification.

NOTE 3 : Allowable length between the different class is applied on size standard.

NOTE 4 : Convert (a+b)/2 or a/20 + 2b small value into average diameter. (a: length, b: width)

total number of a low contrast flaws	zone A	zone B
Standard classified by zones	5	6
Total (zone A + zone B)	8	8

3-3. Reflected color unevenness

The reflected color unevenness which can be confirmed easily in visual check must not exist.

3-4. Stain, blur, unevenness, and other faults

The flaws must not be to be distinguishable in white raster or green raster.

4. Notice for K coating CRT cleaning

4-1. Do not rub CRT surface with hard objects or hit CRT surface.

4-2. Wipe dirt off lightly with dried soft cloth.
Do not use acid cleaner, alkaline cleaner, and solvent thinner.
Use water, alcohol, neutral glass cleaner or detergent when stain cannot be removed with drying cloth.
It salt stain stick to CRT surface, be quick to take out the stain from CRT.

TROUBLE SHOOTING

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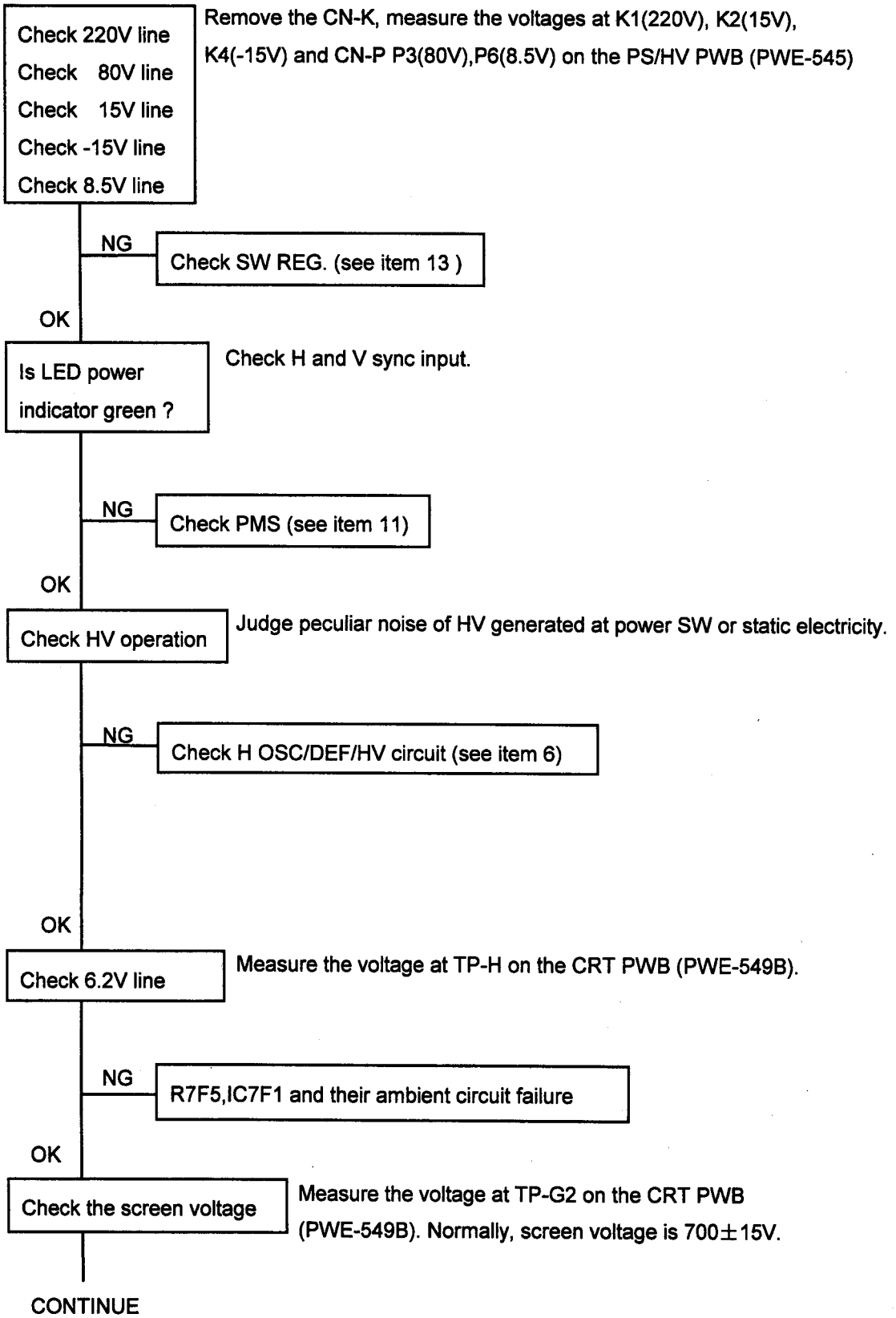
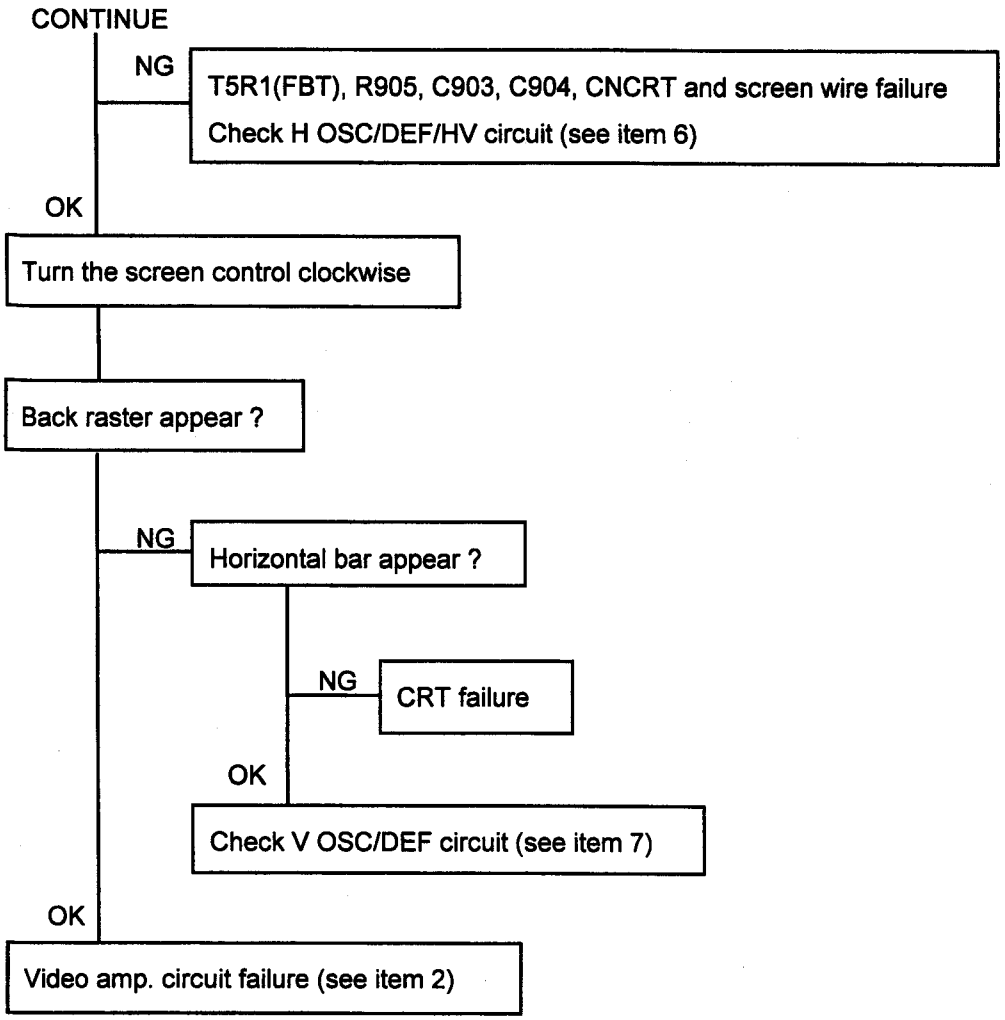
1. NO RASTER


Check 220V line
Check 80V line
Check 15V line
Check -15V line
Check 8.5V line
Remove the CN-K, measure the voltages at K1(220V), K2(15V), K4(-15V) and CN-P P3(80V),P6(8.5V) on the PS/HV PWB (PWE-545)
NG
Check SW REG. (see item 13)
OK
Is LED power indicator green ?
Check H and V sync input.
NG
Check PMS (see item 11)
OK
Check HV operation
Judge peculiar noise of HV generated at power SW or static electricity.
NG
Check H OSC/DEF/HV circuit (see item 6)
OK
Check 6.2V line
Measure the voltage at TP-H on the CRT PWB (PWE-549B).
NG
R7F5,IC7F1 and their ambient circuit failure
OK
Check the screen voltage
Measure the voltage at TP-G2 on the CRT PWB (PWE-549B). Normally, screen voltage is 700±15V.
CONTINUE


CONTINUE
NG
T5R1(FBT), R905, C903, C904, CNCRT and screen wire failure
Check H OSC/DEF/HV circuit (see item 6)
OK
Turn the screen control clockwise
Back raster appear ?
NG
Horizontal bar appear ?
NG
CRT failure
OK
Check V OSC/DEF circuit (see item 7)
OK
Video amp. circuit failure (see item 2)

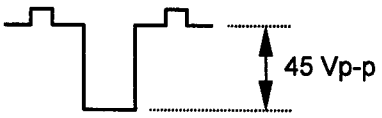
2. ABNORMAL VIDEO ON CRT SCREEN (too dark or too bright)

* Input 1/4 window pattern.

Set up BRIGHTNESS:preset, CONTRAST:max. and R/G/B control:all max. at OSM menu.

Check R/G/B video output

Measure R/G/B video outputs at TP-R, TP-G and TP-B on the CRT PWB (PWE-549B). Normally, R/G/B video output voltages are approx. 45Vp-p with 1/4 window pattern input when the contrast control of the OSM menu is MAX.



NG

Check IC721 output (VIDEO)

Measure the video output at IC721 pins 6(R), 14(G) and 4(B) on VIDEO PWB (PWE-549A).
Normally, the wave form is same as upon figure.

OK

C729R/G/B failure, or CN-SG failure.

NG

Check 80V line

Measure the voltage at CNP 3 on the VIDEO PWB(PWE-549A).

NG

CN-P failure, or check SW-REG (see item 13)

OK

Check Vbb line and 12V line

1) Check the voltage at C726 on the VIDEO PWB(PWE-549A). The voltage is approx. 9.1V_{DC}.
2) Check the voltage at R728 (reverse of ZD721) on the VIDEO PWB (PWE-549A). The voltage is approx. 12V_{DC}.

NG

1) ZD721, C726, R728 failure.
2) CN-AF failure.

OK

Check IC721 input (VIDEO)

Measure the video input at IC721 pins 8(R), 12(G) and 2(B) on VIDEO PWB (PWE-549A). The voltage is approx. 5Vp-p.

OK

IC721 failure.

NG

Check IC711 ouput (VIDEO)

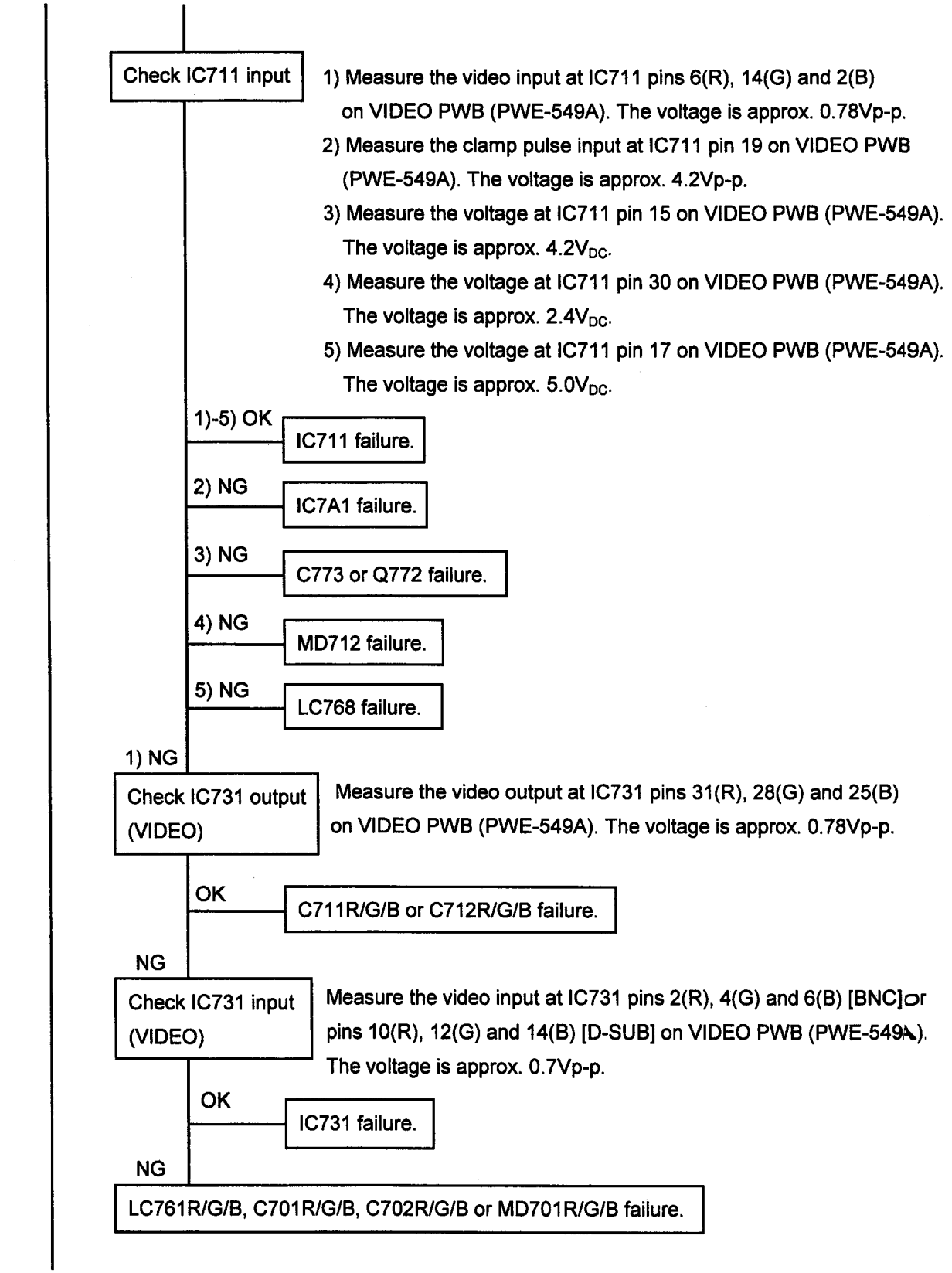
Measure the video output at IC721 pins 32(R), 29(G) and 35(B) on VIDEO PWB (PWE-549A). The voltage is approx. 3Vp-p.

OK

Q711R/G/B failure.

CONTINUE 1 CONTINUE 2

CONTINUE 1 CONTINUE 2

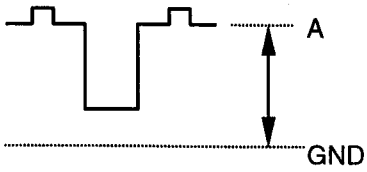

Check IC711 input
1) Measure the video input at IC711 pins 6(R), 14(G) and 2(B) on VIDEO PWB (PWE-549A). The voltage is approx. 0.78Vp-p.
2) Measure the clamp pulse input at IC711 pin 19 on VIDEO PWB (PWE-549A). The voltage is approx. 4.2Vp-p.
3) Measure the voltage at IC711 pin 15 on VIDEO PWB (PWE-549A). The voltage is approx. 4.2VDC.
4) Measure the voltage at IC711 pin 30 on VIDEO PWB (PWE-549A). The voltage is approx. 2.4VDC.
5) Measure the voltage at IC711 pin 17 on VIDEO PWB (PWE-549A). The voltage is approx. 5.0VDC.
1)-5) OK
IC711 failure.
2) NG
IC7A1 failure.
3) NG
C773 or Q772 failure.
4) NG
MD712 failure.
5) NG
LC768 failure.
1) NG
Check IC731 output (VIDEO)
Measure the video output at IC731 pins 31(R), 28(G) and 25(B) on VIDEO PWB (PWE-549A). The voltage is approx. 0.78Vp-p.
OK
C711R/G/B or C712R/G/B failure.
NG
Check IC731 input (VIDEO)
Measure the video input at IC731 pins 2(R), 4(G) and 6(B) [BNC] or pins 10(R), 12(G) and 14(B) [D-SUB] on VIDEO PWB (PWE-549A). The voltage is approx. 0.7Vp-p.
OK
IC731 failure.
NG
LC761R/G/B, C701R/G/B, C702R/G/B or MD701R/G/B failure.

CONTINUE

CONTINUE

Check R/G/B cathode

Measure R/G/B cathode voltages at TP-R, TP-G and TP-B on the CRT PWB (PWE-549B). Normally, the DC voltage is between approx. $80V_{DC}$ and $150V_{DC}$ at point A when BRIGHTNESS is preset. The DC voltage moves 15V or 20V when BRIGHTNESS changes from min. to max..



NG

Check the power supply voltage of clamp circuit

Measure the voltage at C747 on the VIDEO PWB (PWB-549A). The voltage is approx. 220V.

NG

LC768 failure.

OK

D741R/G/B, Q741R/G/B, IC742 or IC751 failure.

OK

Check the screen voltage

Measure the voltage at TP-G2 on the CRT PWB (PWB-549B). Normally, the screen voltage is $700\pm15V_{DC}$. Adjust $700\pm5V_{DC}$ if it is different.

NG

- R905, C903, C904 or CNCRT on the CRT PWB (PWB-549B), T5R1 (FBT) on the SW/HV PWB (PWB-545) or screen wire failure.
- Check H OSC/DEF/HV circuit (see item 6)

OK

Check the heater voltage

Measure the voltage at IC7F1 pin 3 on the CRT PWB (PWE-549B). The voltage is approx. 6.2V.

NG

Check IC7F1 input voltage

Measure the voltage at IC7F1 pin 5 on the CRT PWB (PWE-549B). The voltage is approx. 8.5V.

NG

LC903, R7F5, C764 or CN-HT failure.

OK

Check the heater controlled voltage

Measure the voltage at IC7F1 pin 5 on the CRT PWB (PWE-549B). The voltage is 0V.

OK

IC7F1 failure.

NG

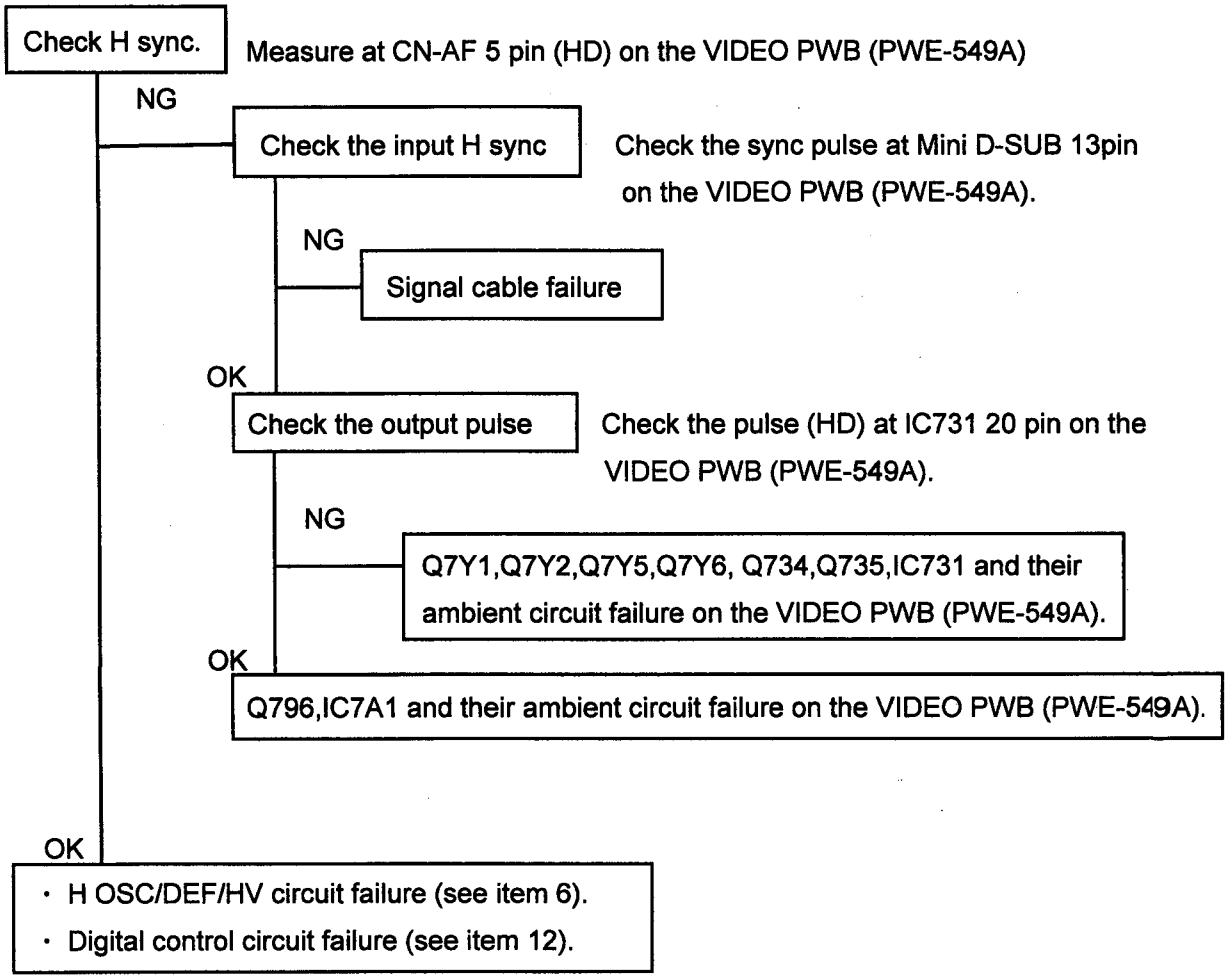
IC801 on the VIDEO PWB (PWB-549A) failure.

OK

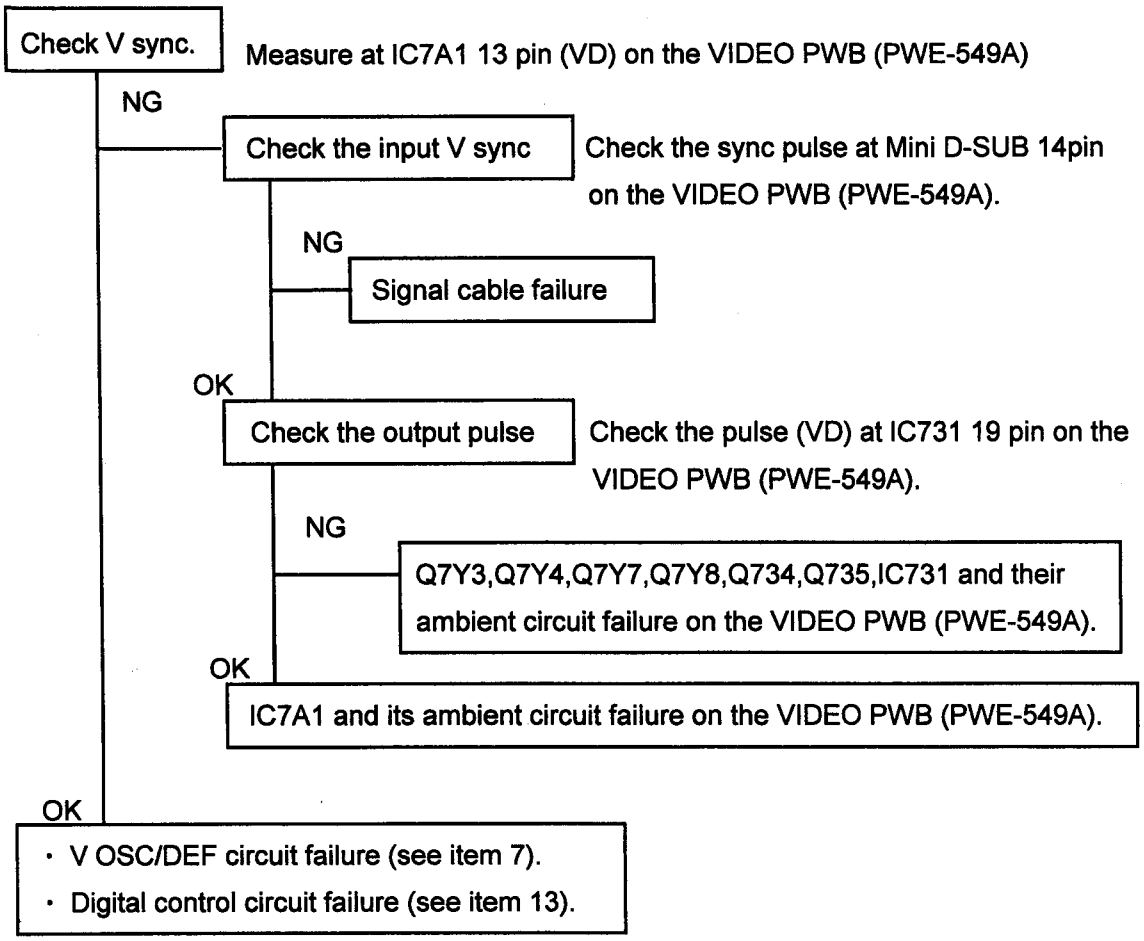
CRT failure.

3. UNSTABLE PICTURE

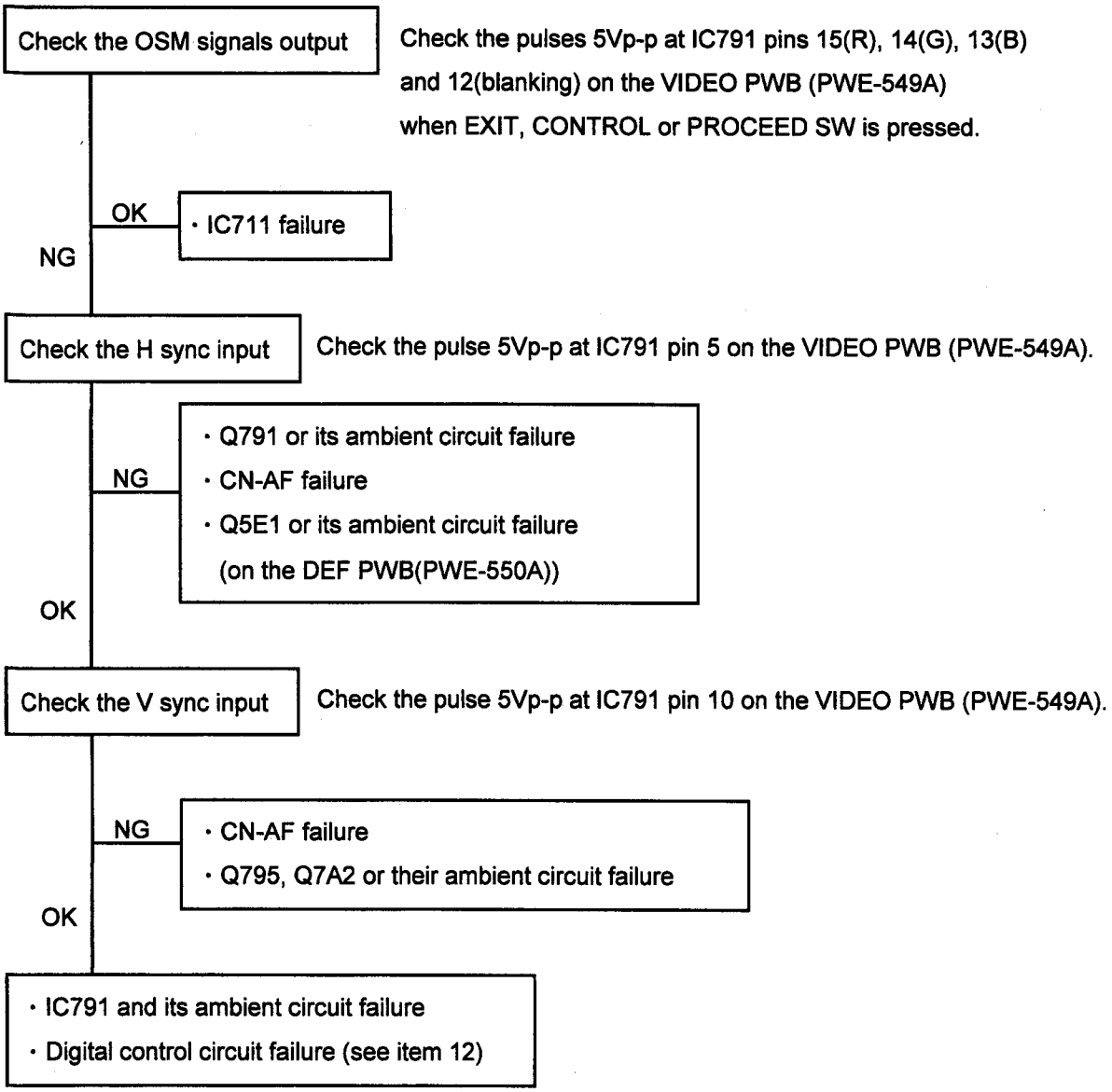
3-1 Horizontal


Check H sync.
Measure at CN-AF 5 pin (HD) on the VIDEO PWB (PWE-549A)
NG
Check the input H sync
Check the sync pulse at Mini D-SUB 13pin on the VIDEO PWB (PWE-549A).
NG
Signal cable failure
OK
Check the output pulse
Check the pulse (HD) at IC731 20 pin on the VIDEO PWB (PWE-549A).
NG
Q7Y1,Q7Y2,Q7Y5,Q7Y6, Q734,Q735,IC731 and their ambient circuit failure on the VIDEO PWB (PWE-549A).
OK
Q796,IC7A1 and their ambient circuit failure on the VIDEO PWB (PWE-549A).
OK
• H OSC/DEF/HV circuit failure (see item 6).
• Digital control circuit failure (see item 12).

3-2 Vertical


Check V sync.
Measure at IC7A1 13 pin (VD) on the VIDEO PWB (PWE-549A)
NG
Check the input V sync
Check the sync pulse at Mini D-SUB 14pin on the VIDEO PWB (PWE-549A).
NG
Signal cable failure
OK
Check the output pulse
Check the pulse (VD) at IC731 19 pin on the VIDEO PWB (PWE-549A).
NG
Q7Y3,Q7Y4,Q7Y7,Q7Y8,Q734,Q735,IC731 and their ambient circuit failure on the VIDEO PWB (PWE-549A).
OK
IC7A1 and its ambient circuit failure on the VIDEO PWB (PWE-549A).
OK
• V OSC/DEF circuit failure (see item 7).
• Digital control circuit failure (see item 13).

4. ON SCREEN MANAGER (OSM) FAILURE


Check the OSM signals output
Check the pulses 5Vp-p at IC791 pins 15(R), 14(G), 13(B) and 12(blanking) on the VIDEO PWB (PWE-549A) when EXIT, CONTROL or PROCEED SW is pressed.
OK
· IC711 failure
NG
Check the H sync input
Check the pulse 5Vp-p at IC791 pin 5 on the VIDEO PWB (PWE-549A).
NG
· Q791 or its ambient circuit failure
· CN-AF failure
· Q5E1 or its ambient circuit failure
(on the DEF PWB(PWE-550A))
OK
Check the V sync input
Check the pulse 5Vp-p at IC791 pin 10 on the VIDEO PWB (PWE-549A).
NG
· CN-AF failure
· Q795, Q7A2 or their ambient circuit failure
OK
· IC791 and its ambient circuit failure
· Digital control circuit failure (see item 12)

5. ABNORMAL PICTURE

5-1. Horizontal Size

Check HV voltage — Measure the voltage at CRT anode. Normally, the voltage is approx. 27KV.

NG → HV circuit failure (see item 6)

OK

Check 8.5V line — Check the voltage at CNP pin 6 on the VIDEO PWB (PWE-549A).

NG → SW REG. failure (see item 13)

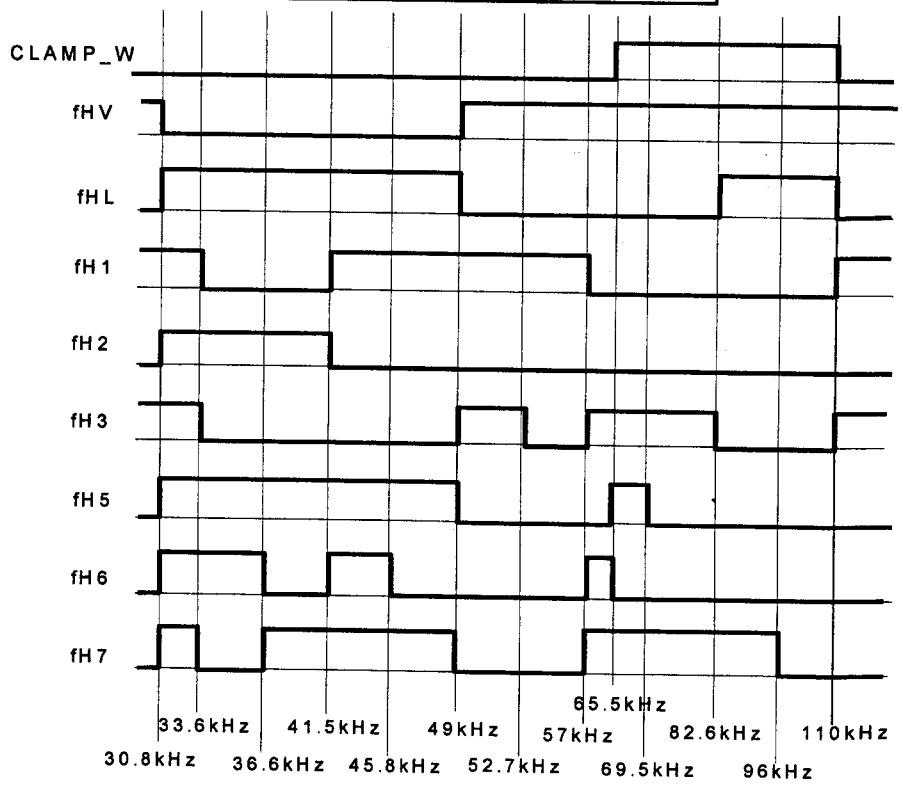
OK

Check the voltage which is supplied to CPU

NG → IC801, IC802, IC8G1, IC7A1or their ambient circuit failure

OK

Check the horizontal frequency mode output (IC571 pins 4~12) See Fig 5.1.1



CONTINUE

Fig 5.1.1

CONTINUE

NG — IC571 failure

OK

Check S-correction capacitor switching circuit

Check the operation of MQ571

NG — MQ571 failure

OK

Check whether IC592 pin 1 on DEF PWB and IC531 pin 12 vary by horizontal size control in OSM menu or not

Measure the voltage at IC592 pin 1 and IC531 pin 12.
Normally, pin 1 voltage varies from approx. 5V to 6V and pin 12 voltage varies from approx. 0.9V to 5V.

NG — Digital control circuit or IC592 failure

OK

Check Q561 FBP
See Fig 5.1.2

Measure the voltage at Q561 Collector.
Normally, this voltage varies from 850 to 1200V by H-SIZE control for user.

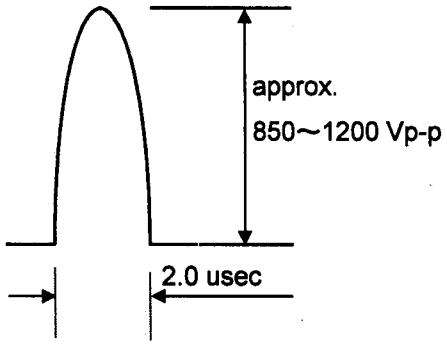


Fig 5.1.2

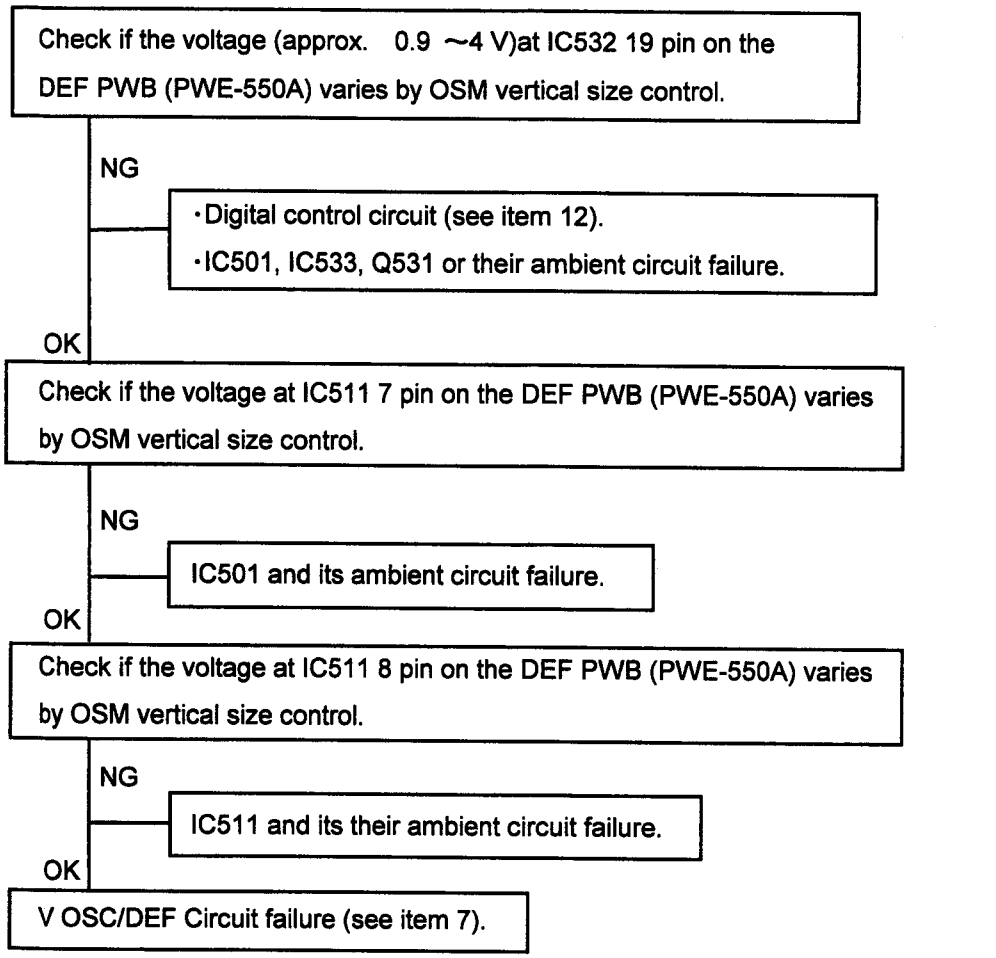
NG — Q561, D561, D562, C561, H-DY or their ambient circuit failure

OK

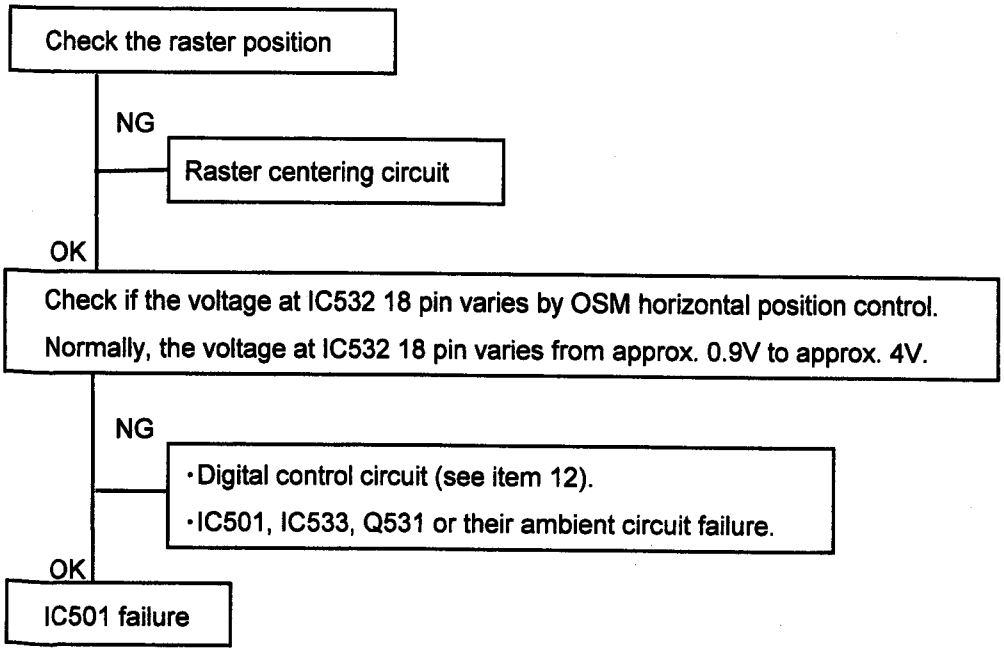
Check the distortion correction circuit (see item 5-6)

H OSC/DEF/HV circuit failure (see item 6).

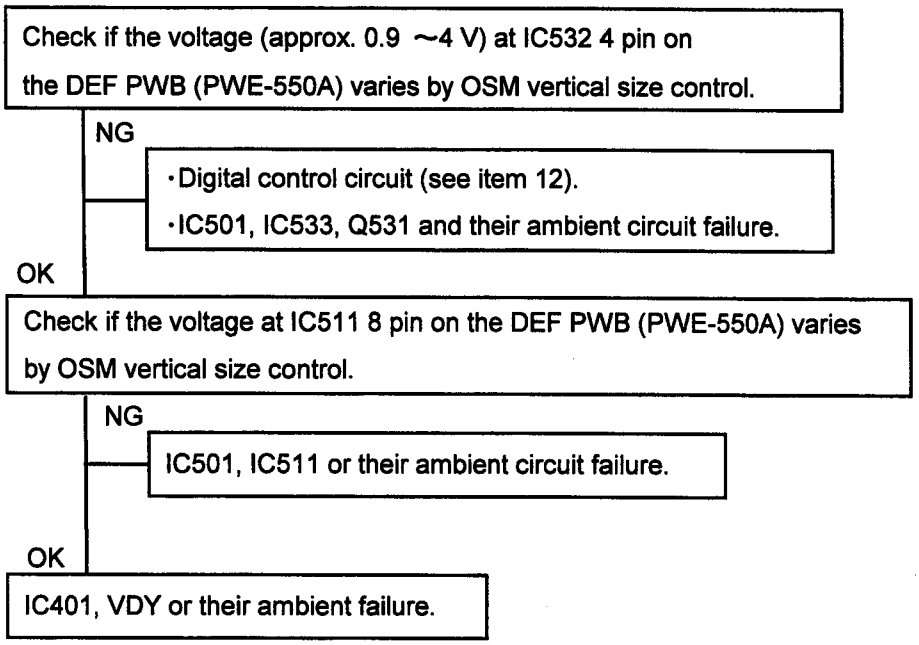
5-2. Vertical Size


Check if the voltage (approx. 0.9 ~4 V)at IC532 19 pin on the DEF PWB (PWE-550A) varies by OSM vertical size control.
NG
·Digital control circuit (see item 12).
·IC501, IC533, Q531 or their ambient circuit failure.
OK
Check if the voltage at IC511 7 pin on the DEF PWB (PWE-550A) varies by OSM vertical size control.
NG
IC501 and its ambient circuit failure.
OK
Check if the voltage at IC511 8 pin on the DEF PWB (PWE-550A) varies by OSM vertical size control.
NG
IC511 and its their ambient circuit failure.
OK
V OSC/DEF Circuit failure (see item 7).

5-3. Horizontal Position

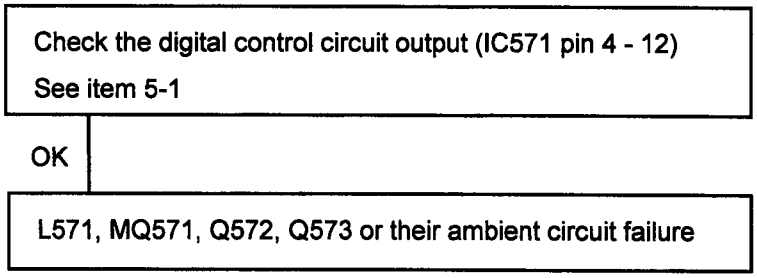

Check the raster position
NG
Raster centering circuit
OK
Check if the voltage at IC532 18 pin varies by OSM horizontal position control.
Normally, the voltage at IC532 18 pin varies from approx. 0.9V to approx. 4V.
NG
·Digital control circuit (see item 12).
·IC501, IC533, Q531 or their ambient circuit failure.
OK
IC501 failure

5-4. Vertical Position

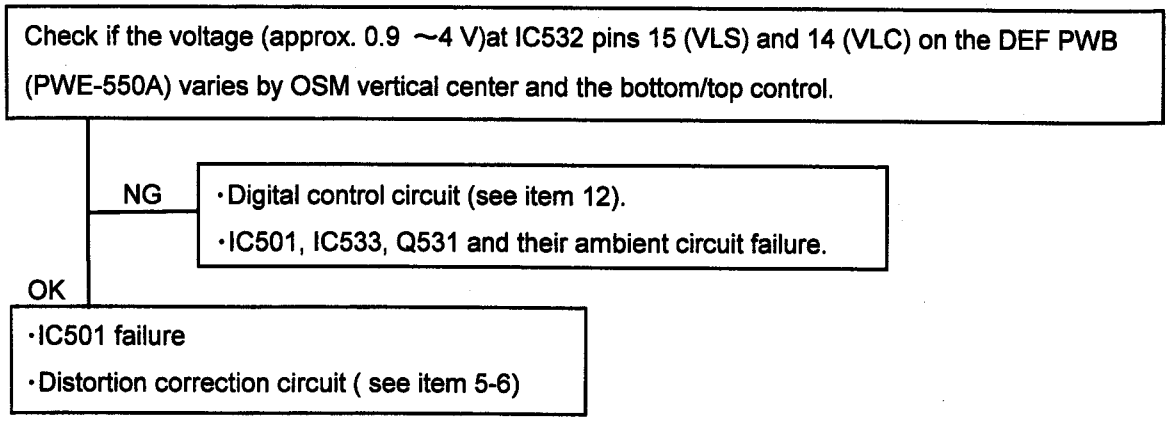

Check if the voltage (approx. 0.9 ~4 V) at IC532 4 pin on the DEF PWB (PWE-550A) varies by OSM vertical size control.
NG
・Digital control circuit (see item 12).
・IC501, IC533, Q531 and their ambient circuit failure.
OK
Check if the voltage at IC511 8 pin on the DEF PWB (PWE-550A) varies by OSM vertical size control.
NG
IC501, IC511 or their ambient circuit failure.
OK
IC401, VDY or their ambient failure.

5-5. Poor Linearity

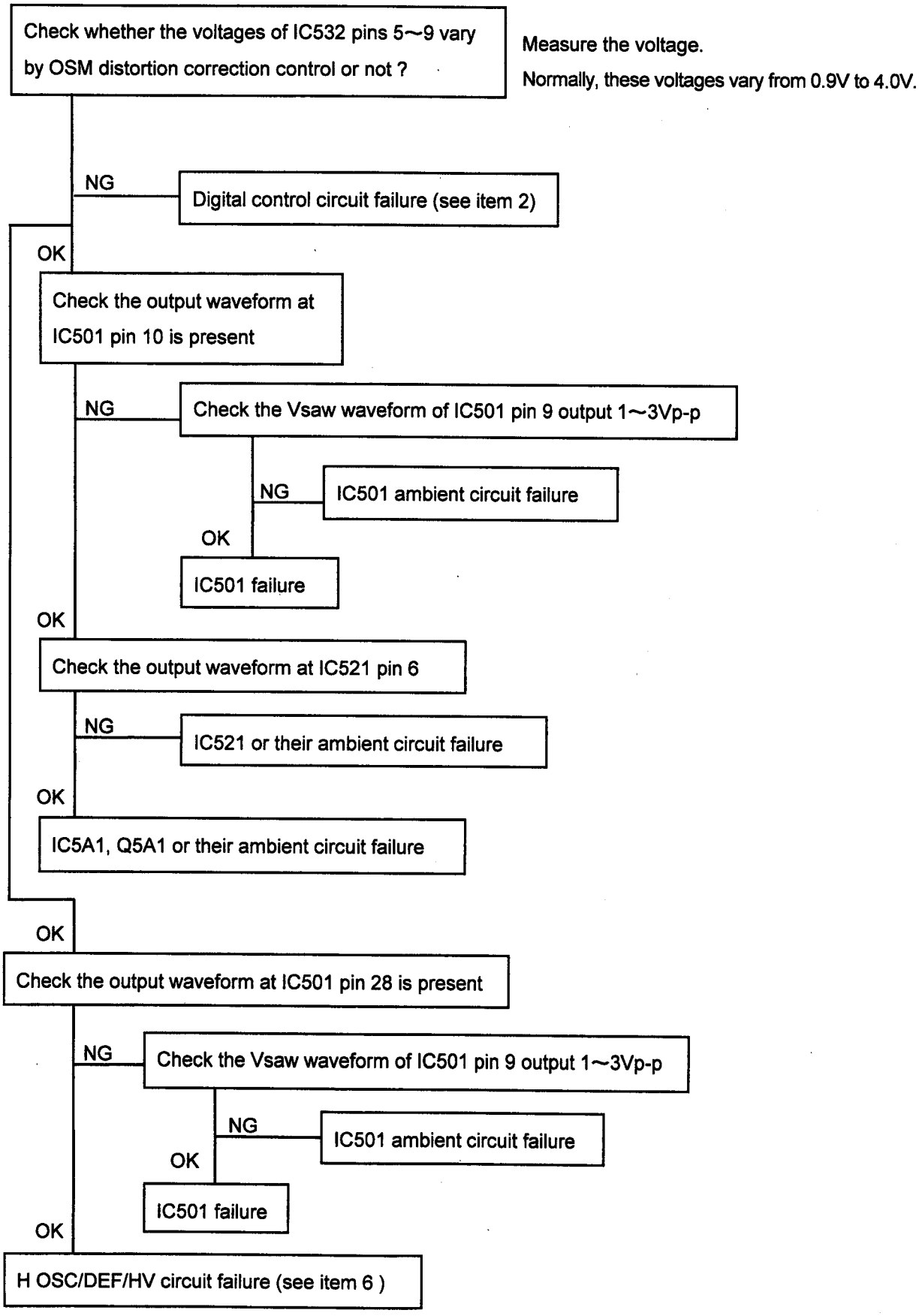
5-5-1. Horizontal


Check the digital control circuit output (IC571 pin 4 - 12)
See item 5-1
OK
L571, MQ571, Q572, Q573 or their ambient circuit failure

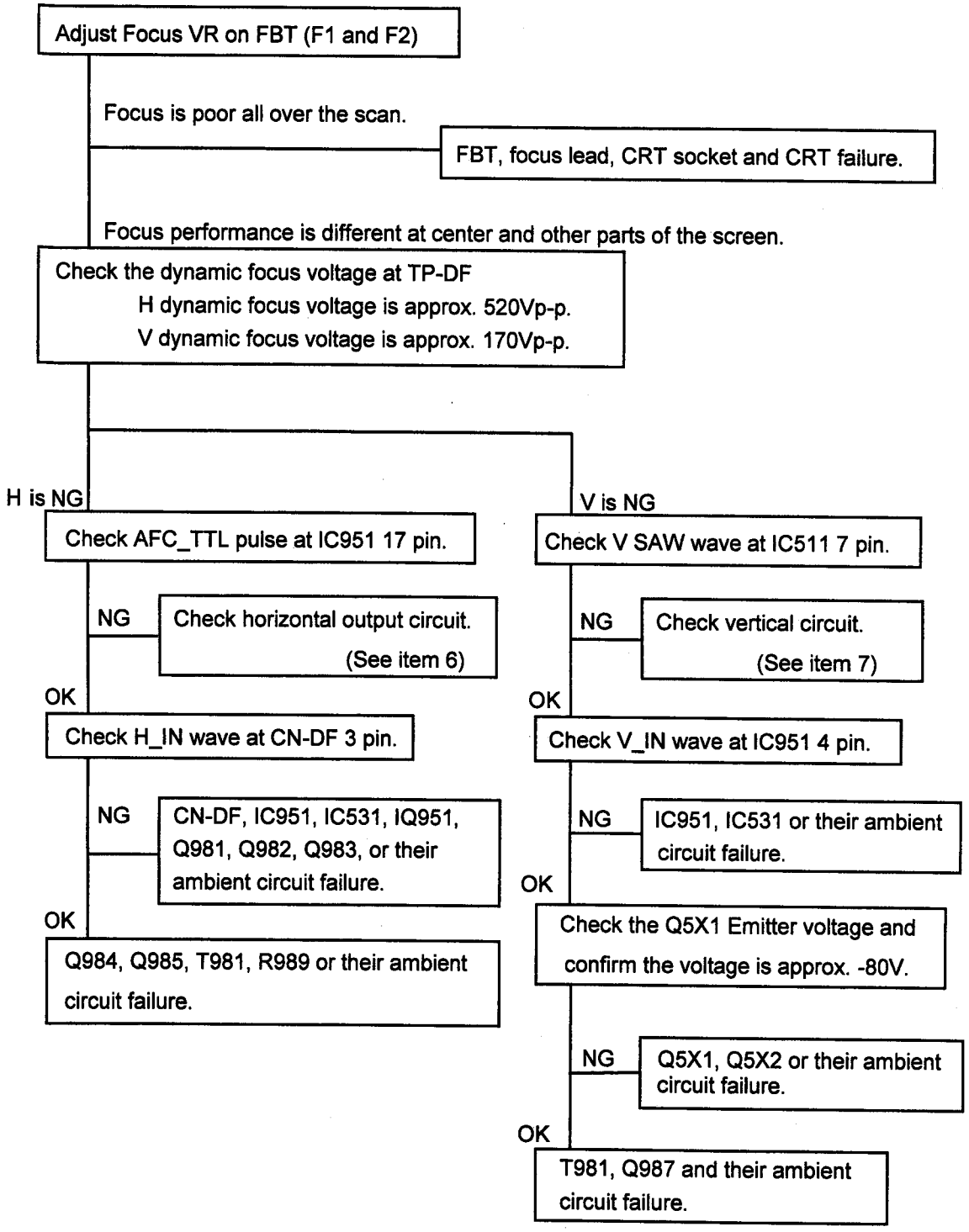
5-5-2. Vertical


Check if the voltage (approx. 0.9 ~4 V)at IC532 pins 15 (VLS) and 14 (VLC) on the DEF PWB (PWE-550A) varies by OSM vertical center and the bottom/top control.
NG
・Digital control circuit (see item 12).
・IC501, IC533, Q531 and their ambient circuit failure.
OK
・IC501 failure
・Distortion correction circuit (see item 5-6)

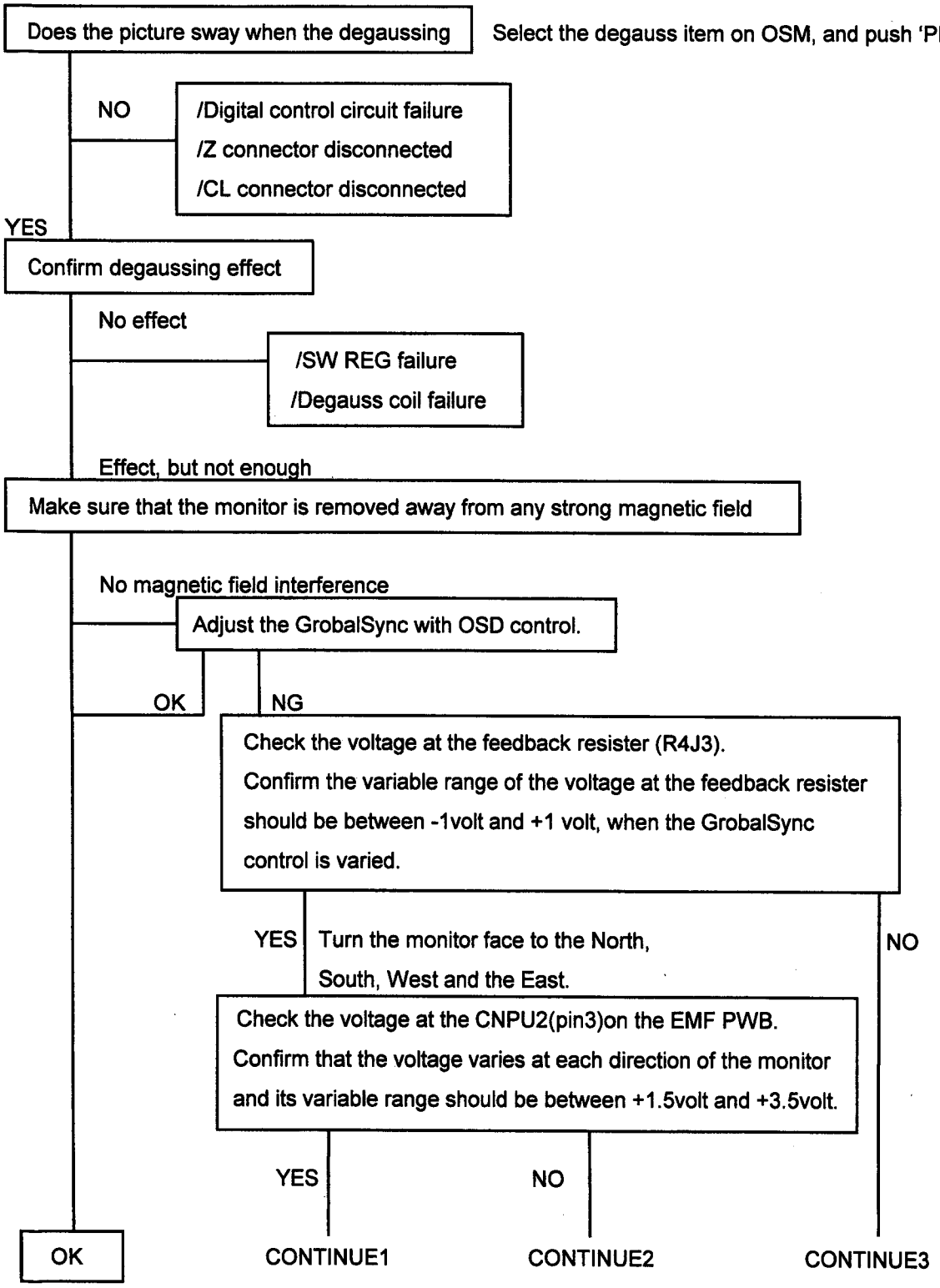
5-6. Distortion Correction Circuit

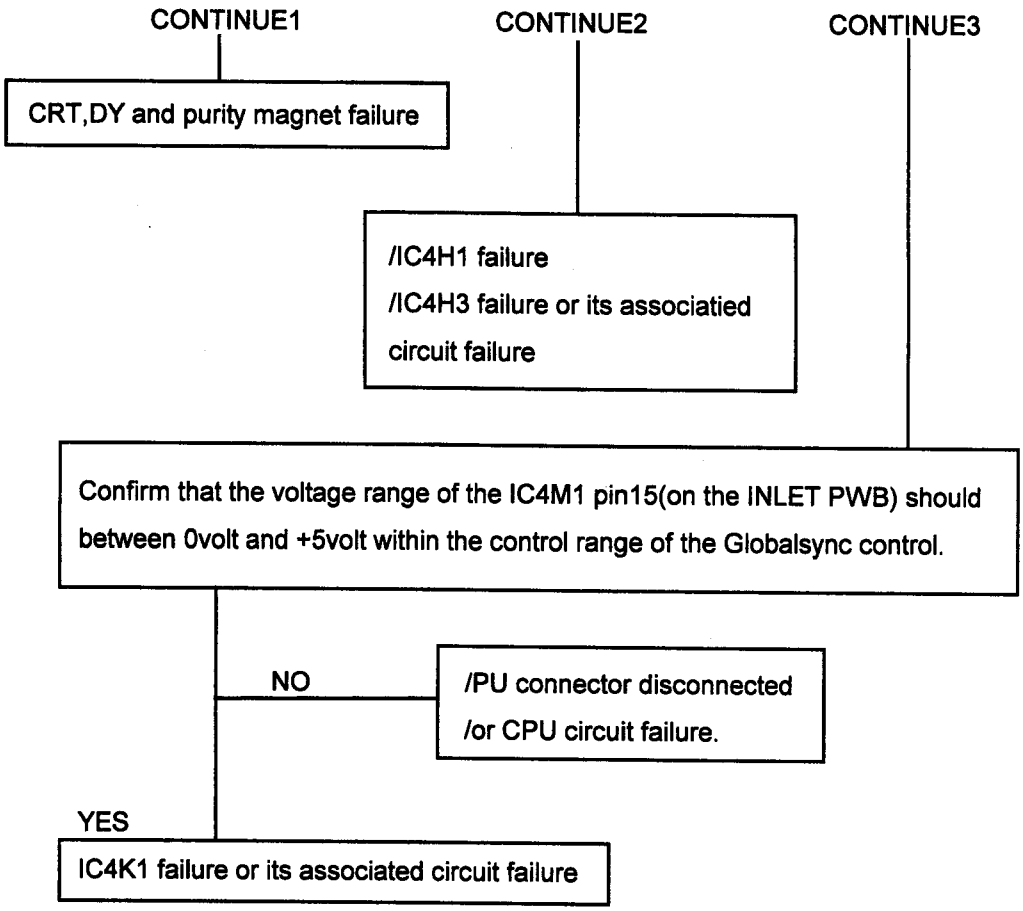

Check whether the voltages of IC532 pins 5~9 vary by OSM distortion correction control or not ?
Measure the voltage.
Normally, these voltages vary from 0.9V to 4.0V.
NG
Digital control circuit failure (see item 2)
OK
Check the output waveform at IC501 pin 10 is present
NG
Check the Vsaw waveform of IC501 pin 9 output 1~3Vp-p
NG
IC501 ambient circuit failure
OK
IC501 failure
OK
Check the output waveform at IC521 pin 6
NG
IC521 or their ambient circuit failure
OK
IC5A1, Q5A1 or their ambient circuit failure
OK
Check the output waveform at IC501 pin 28 is present
NG
Check the Vsaw waveform of IC501 pin 9 output 1~3Vp-p
NG
IC501 ambient circuit failure
OK
IC501 failure
OK
H OSC/DEF/HV circuit failure (see item 6)

5-7. Poor Focus


Adjust Focus VR on FBT (F1 and F2)
Focus is poor all over the scan.
FBT, focus lead, CRT socket and CRT failure.
Focus performance is different at center and other parts of the screen.
Check the dynamic focus voltage at TP-DF
H dynamic focus voltage is approx. 520Vp-p.
V dynamic focus voltage is approx. 170Vp-p.
H is NG
Check AFC_TTL pulse at IC951 17 pin.
NG
Check horizontal output circuit.
(See item 6)
OK
Check H_IN wave at CN-DF 3 pin.
NG
CN-DF, IC951, IC531, IQ951, Q981, Q982, Q983, or their ambient circuit failure.
OK
Q984, Q985, T981, R989 or their ambient circuit failure.
V is NG
Check V SAW wave at IC511 7 pin.
NG
Check vertical circuit.
(See item 7)
OK
Check V_IN wave at IC951 4 pin.
NG
IC951, IC531 or their ambient circuit failure.
OK
Check the Q5X1 Emitter voltage and confirm the voltage is approx. -80V.
NG
Q5X1, Q5X2 or their ambient circuit failure.
OK
T981, Q987 and their ambient circuit failure.

5-8. Impurity On CRT Screen


Does the picture sway when the degaussing
Select the degauss item on OSM, and push 'PROCEED'
NO
/Digital control circuit failure
/Z connector disconnected
/CL connector disconnected
YES
Confirm degaussing effect
No effect
/SW REG failure
/Degauss coil failure
Effect, but not enough
Make sure that the monitor is removed away from any strong magnetic field
No magnetic field interference
Adjust the GrobalSync with OSD control.
OK
NG
Check the voltage at the feedback resister (R4J3).
Confirm the variable range of the voltage at the feedback resister should be between -1volt and +1 volt, when the GrobalSync control is varied.
YES
Turn the monitor face to the North, South, West and the East.
NO
Check the voltage at the CNPU2(pin3)on the EMF PWB.
Confirm that the voltage varies at each direction of the monitor and its variable range should be between +1.5volt and +3.5volt.
YES
NO
OK
CONTINUE1
CONTINUE2
CONTINUE3


CONTINUE1
CONTINUE2
CONTINUE3
CRT,DY and purity magnet failure
/IC4H1 failure
/IC4H3 failure or its associatied
circuit failure
Confirm that the voltage range of the IC4M1 pin15(on the INLET PWB) should
between 0volt and +5volt within the control range of the Globalsync control.
NO
/PU connector disconnected
/or CPU circuit failure.
YES
IC4K1 failure or its associated circuit failure

6. H OSC / DEF / HV CIRCUIT FAILURE

Check the horizontal drive pulse

Check the drive pulse at IC592 pin 8 on the DEF PWB output a rectangle waveform which amplitude is 8Vp-p.

OK

Check the IC592 pin 3 waveform

Measure this waveform. Normally, it is sawtooth waveform which amplitude is approx. 5Vp-p.

NG

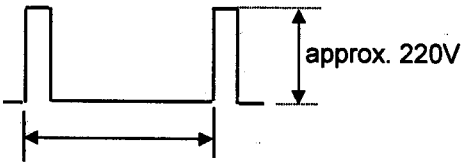
NG

IC592 or their ambient parts failure

OK

Check the waveform of gate at Q5G1

Be sure to get the L592 off the DEF PWB, and output as following.



NG

Q5G1, ZD5G1, D5G2, or their ambient parts failure

OK

Note : Q561, Q5G1 and Q5A1 will short out at same time.

Check the voltage for horizontal drive

Measure the voltage at Q555 collector. Normally, it is approx. 15V

NG

R562 failure

OK

Check HV voltage

Measure CRT anode voltage. Normally, HV voltage is approx. 27kV.

NG

Check 80V line

Measure the voltage at CN-P pin 3 on the SW/HV PWB(PWE-545).

NG

Remove L5R1 and check 80V line again.

OK

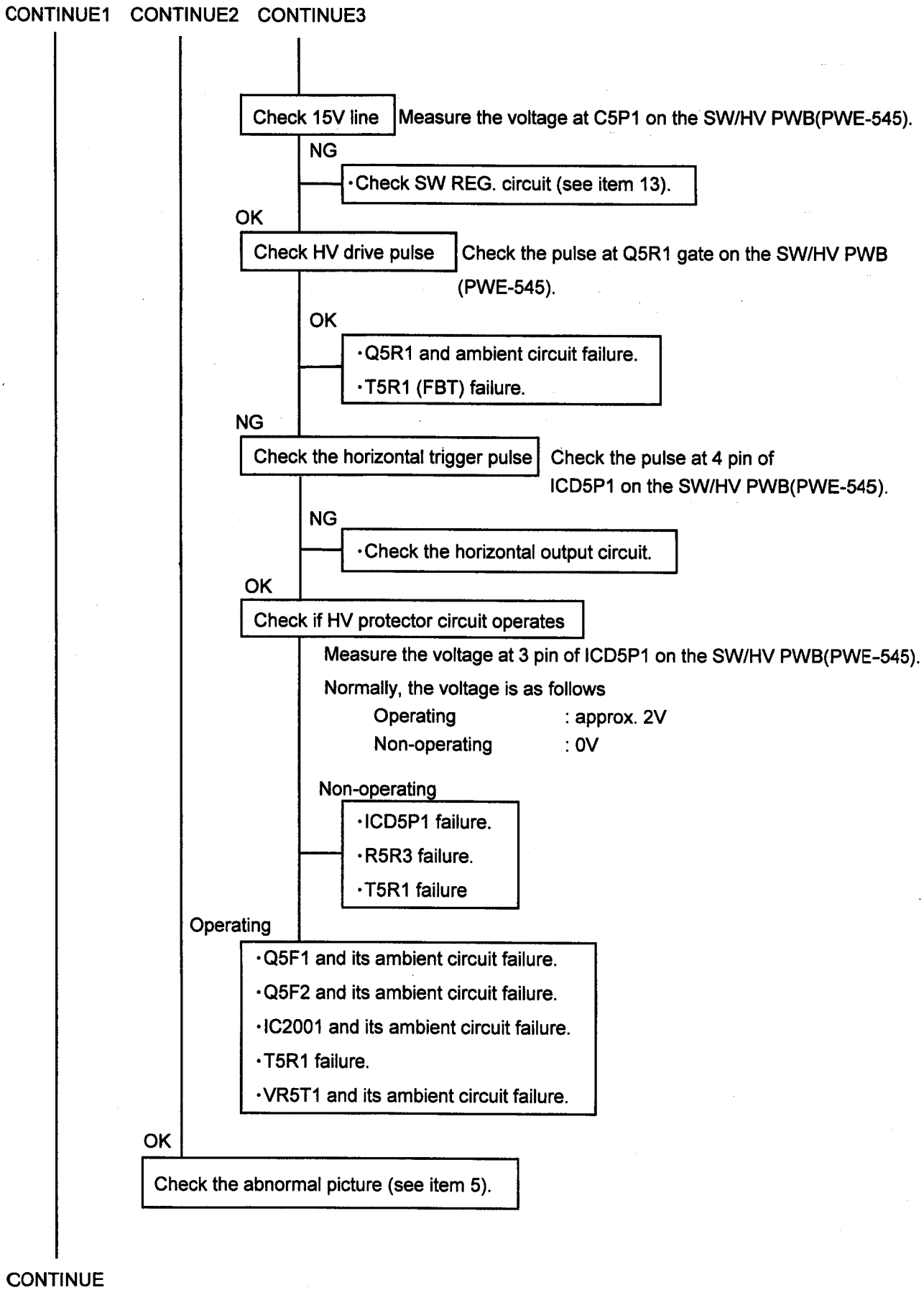
OK

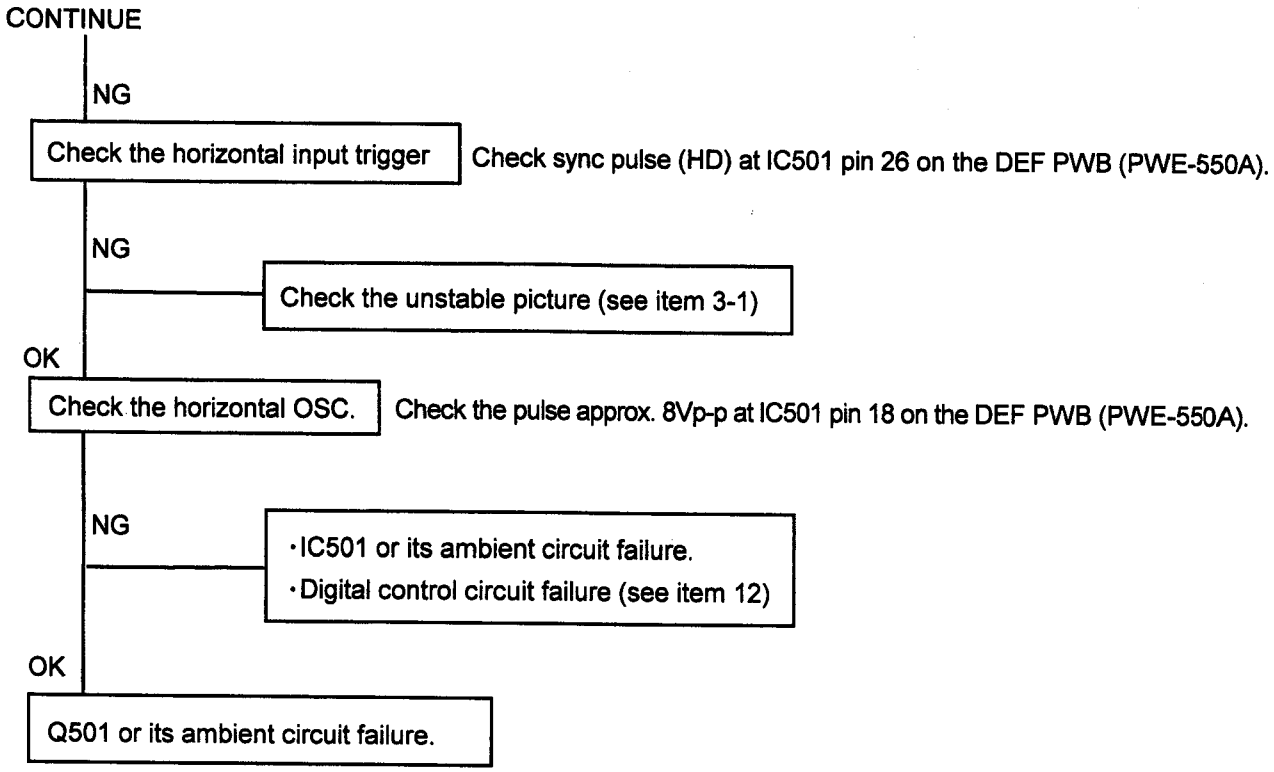
Q5R1 and its ambient circuit failure.

NG

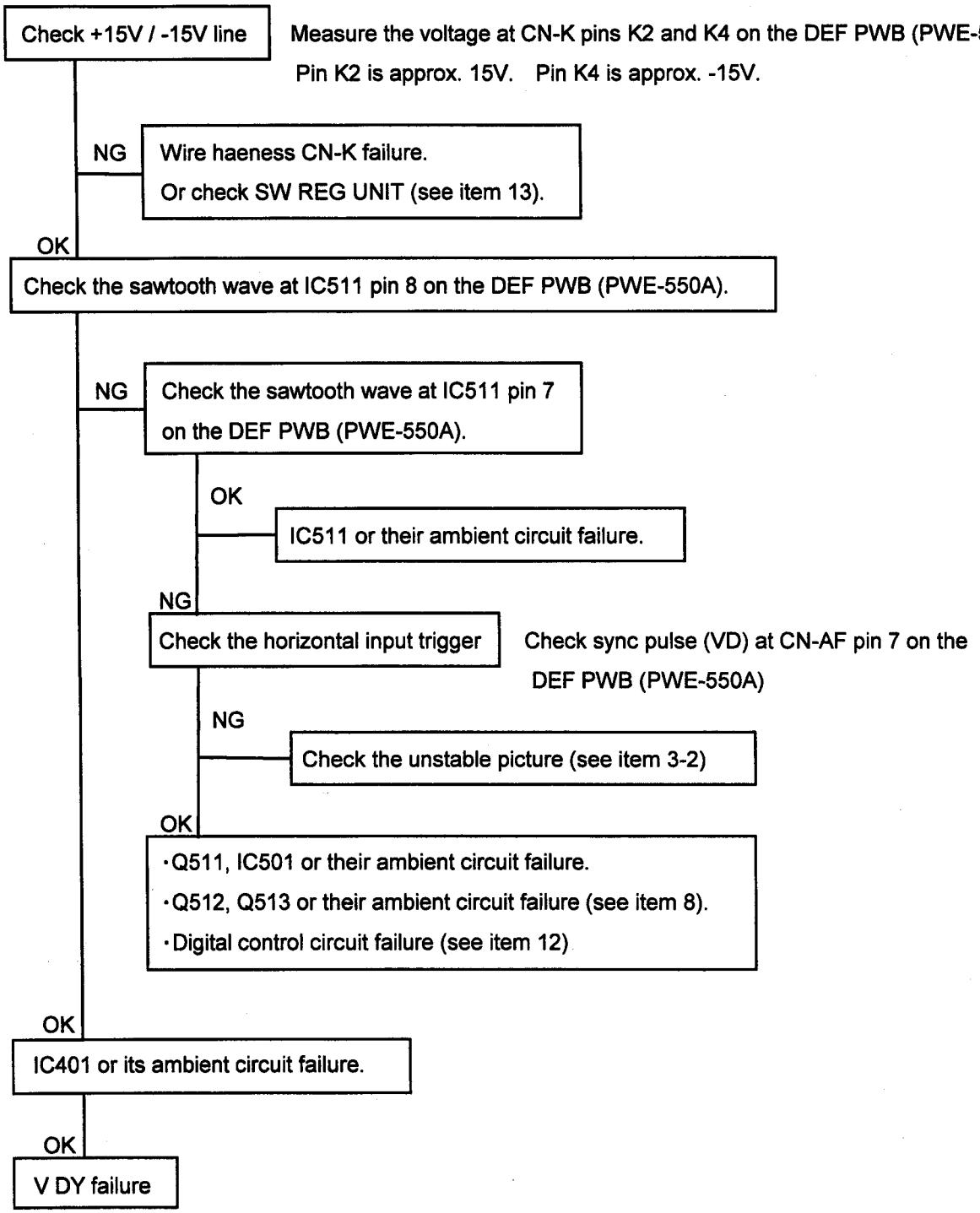
- Video amplifier IC721 on the VIDEO PWB(PWE-549A) failure
- Check SW REG circuit. (see item 13)

CONTINUE1 CONTINUE2 CONTINUE3

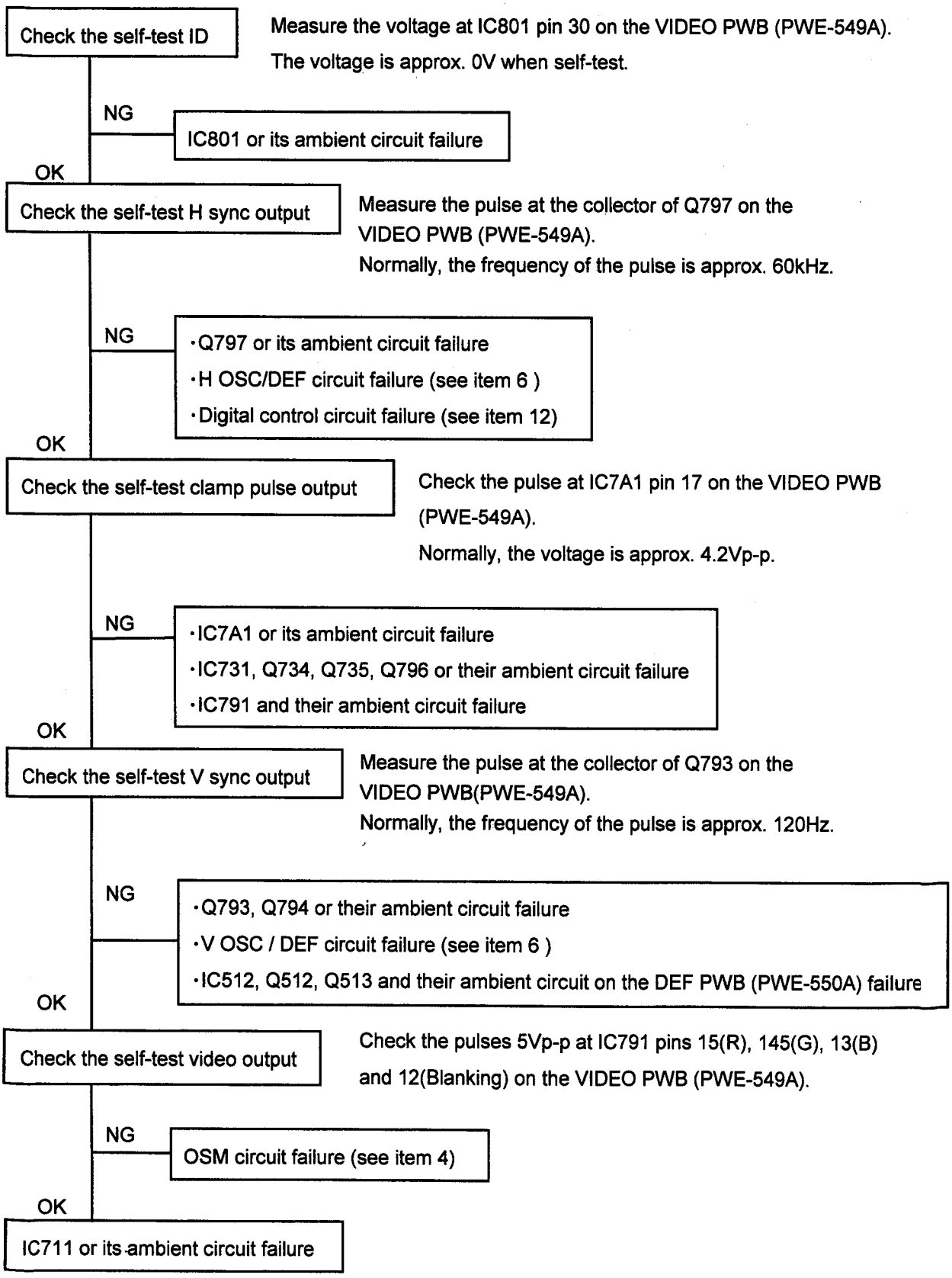

CONTINUE1
CONTINUE2
CONTINUE3
Check 15V line
Measure the voltage at C5P1 on the SW/HV PWB(PWE-545).
NG
·Check SW REG. circuit (see item 13).
OK
Check HV drive pulse
Check the pulse at Q5R1 gate on the SW/HV PWB (PWE-545).
OK
·Q5R1 and ambient circuit failure.
·T5R1 (FBT) failure.
NG
Check the horizontal trigger pulse
Check the pulse at 4 pin of ICD5P1 on the SW/HV PWB(PWE-545).
NG
·Check the horizontal output circuit.
OK
Check if HV protector circuit operates
Measure the voltage at 3 pin of ICD5P1 on the SW/HV PWB(PWE-545).
Normally, the voltage is as follows
Operating : approx. 2V
Non-operating : 0V
Non-operating
·ICD5P1 failure.
·R5R3 failure.
·T5R1 failure
Operating
·Q5F1 and its ambient circuit failure.
·Q5F2 and its ambient circuit failure.
·IC2001 and its ambient circuit failure.
·T5R1 failure.
·VR5T1 and its ambient circuit failure.
OK
Check the abnormal picture (see item 5).
CONTINUE


CONTINUE
NG
Check the horizontal input trigger
Check sync pulse (HD) at IC501 pin 26 on the DEF PWB (PWE-550A).
NG
Check the unstable picture (see item 3-1)
OK
Check the horizontal OSC.
Check the pulse approx. 8Vp-p at IC501 pin 18 on the DEF PWB (PWE-550A).
NG
·IC501 or its ambient circuit failure.
·Digital control circuit failure (see item 12)
OK
Q501 or its ambient circuit failure.

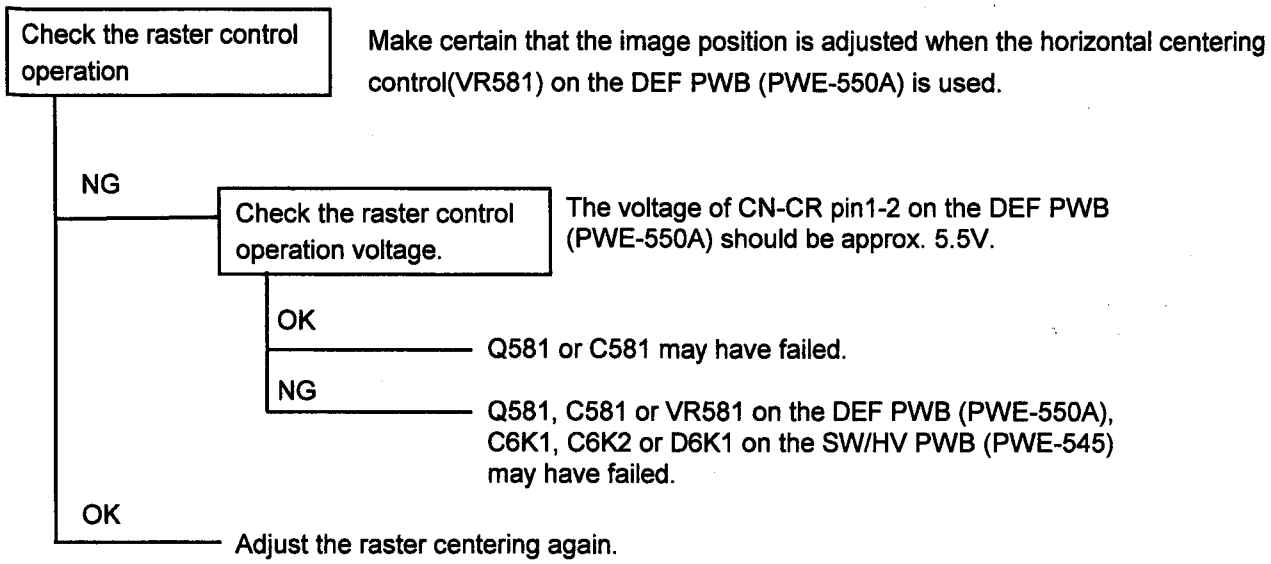
7. V OSC / DEF CIRCUIT FAILURE


Check +15V / -15V line
Measure the voltage at CN-K pins K2 and K4 on the DEF PWB (PWE-550A).
Pin K2 is approx. 15V. Pin K4 is approx. -15V.
NG
Wire haeness CN-K failure.
Or check SW REG UNIT (see item 13).
OK
Check the sawtooth wave at IC511 pin 8 on the DEF PWB (PWE-550A).
NG
Check the sawtooth wave at IC511 pin 7
on the DEF PWB (PWE-550A).
OK
IC511 or their ambient circuit failure.
NG
Check the horizontal input trigger
Check sync pulse (VD) at CN-AF pin 7 on the
DEF PWB (PWE-550A)
NG
Check the unstable picture (see item 3-2)
OK
·Q511, IC501 or their ambient circuit failure.
·Q512, Q513 or their ambient circuit failure (see item 8).
·Digital control circuit failure (see item 12)
OK
IC401 or its ambient circuit failure.
OK
V DY failure

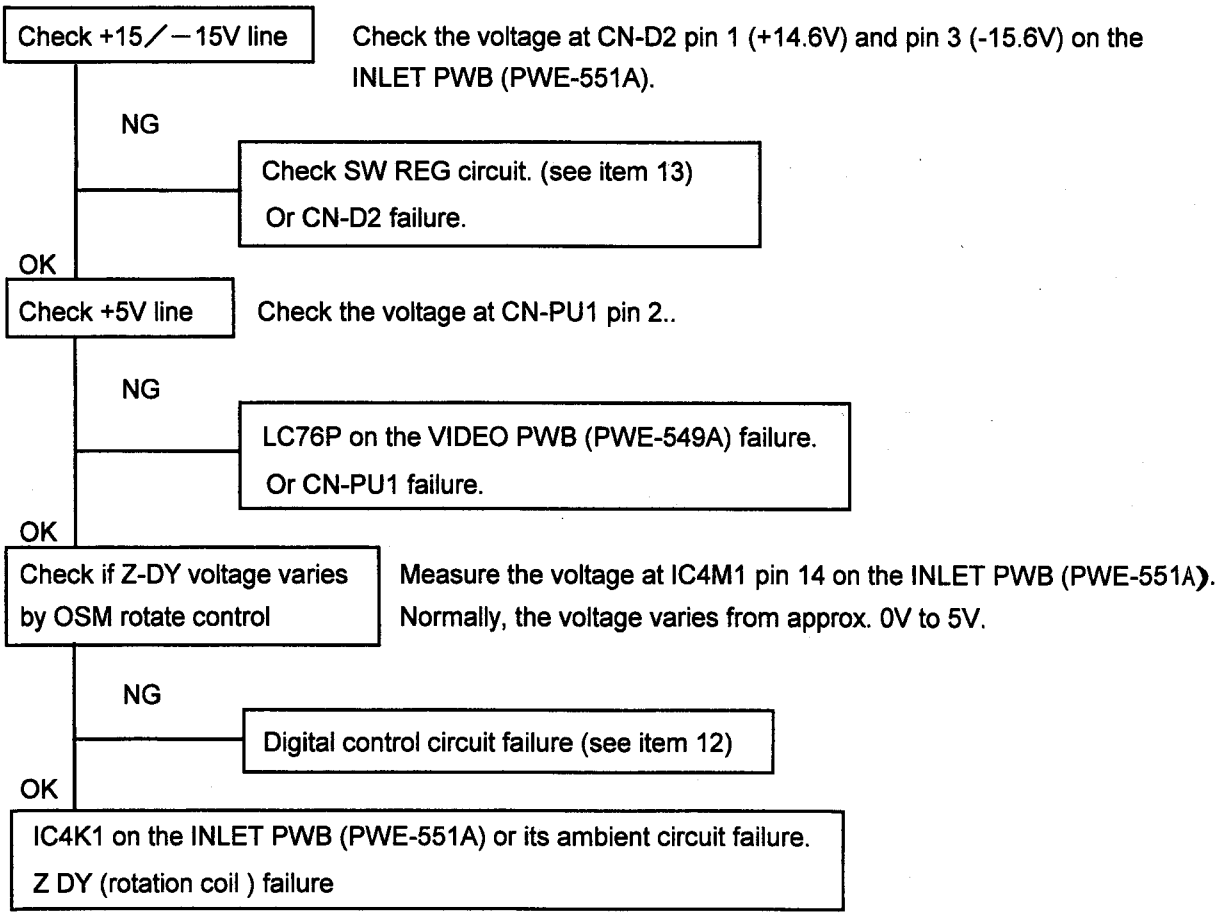
8. SELF TEST ERROR


Check the self-test ID
Measure the voltage at IC801 pin 30 on the VIDEO PWB (PWE-549A).
The voltage is approx. 0V when self-test.
NG
IC801 or its ambient circuit failure
OK
Check the self-test H sync output
Measure the pulse at the collector of Q797 on the VIDEO PWB (PWE-549A).
Normally, the frequency of the pulse is approx. 60kHz.
NG
·Q797 or its ambient circuit failure
·H OSC/DEF circuit failure (see item 6)
·Digital control circuit failure (see item 12)
OK
Check the self-test clamp pulse output
Check the pulse at IC7A1 pin 17 on the VIDEO PWB (PWE-549A).
Normally, the voltage is approx. 4.2Vp-p.
NG
·IC7A1 or its ambient circuit failure
·IC731, Q734, Q735, Q796 or their ambient circuit failure
·IC791 and their ambient circuit failure
OK
Check the self-test V sync output
Measure the pulse at the collector of Q793 on the VIDEO PWB(PWE-549A).
Normally, the frequency of the pulse is approx. 120Hz.
NG
·Q793, Q794 or their ambient circuit failure
·V OSC / DEF circuit failure (see item 6)
·IC512, Q512, Q513 and their ambient circuit on the DEF PWB (PWE-550A) failure
OK
Check the self-test video output
Check the pulses 5Vp-p at IC791 pins 15(R), 145(G), 13(B) and 12(Blanking) on the VIDEO PWB (PWE-549A).
NG
OSM circuit failure (see item 4)
OK
IC711 or its ambient circuit failure

9. RASTER CENTERING CIRCUIT FAILURE

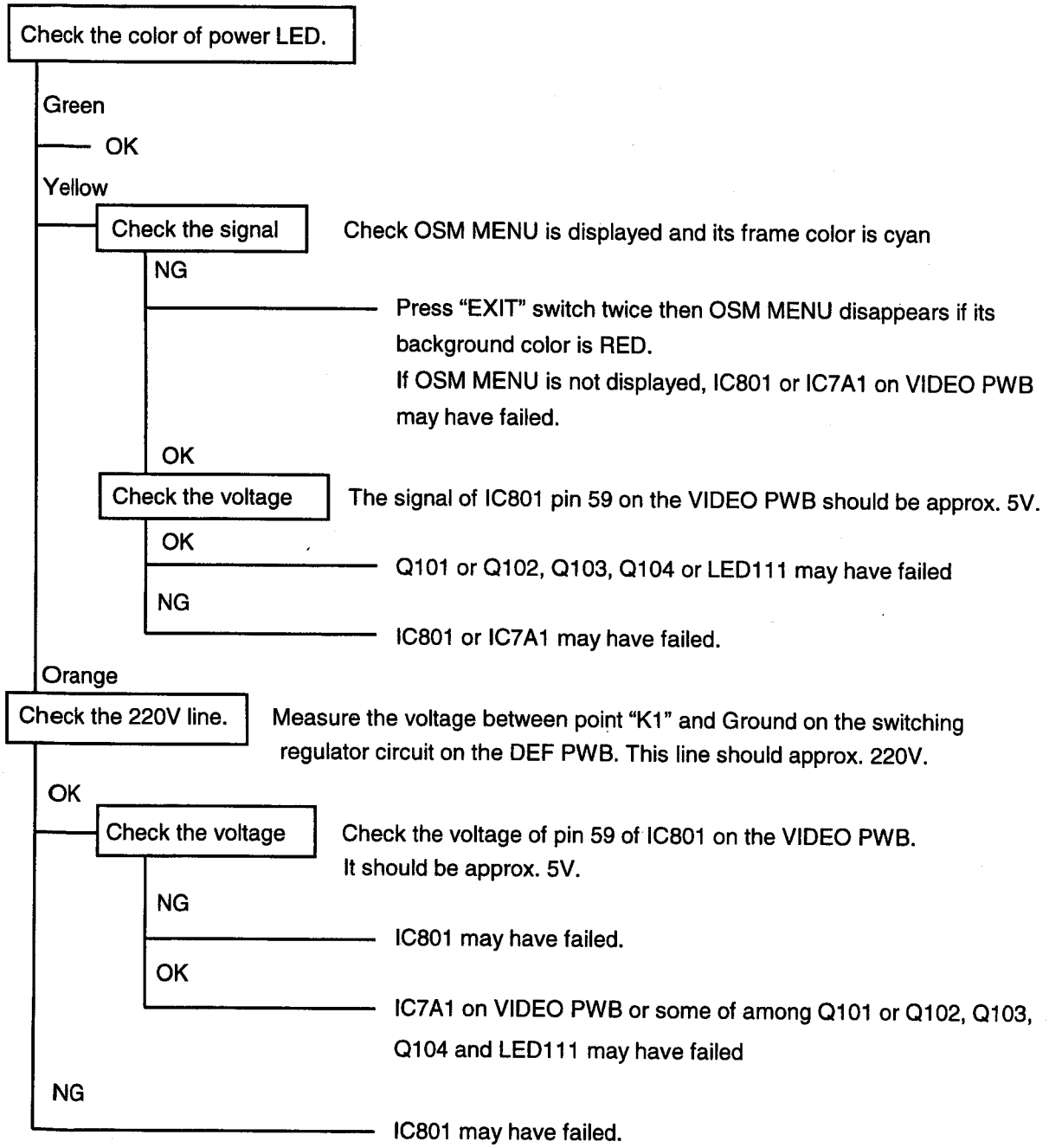

Check the raster control operation
Make certain that the image position is adjusted when the horizontal centering control(VR581) on the DEF PWB (PWE-550A) is used.
NG
Check the raster control operation voltage.
The voltage of CN-CR pin1-2 on the DEF PWB (PWE-550A) should be approx. 5.5V.
OK
Q581 or C581 may have failed.
NG
Q581, C581 or VR581 on the DEF PWB (PWE-550A), C6K1, C6K2 or D6K1 on the SW/HV PWB (PWE-545) may have failed.
OK
Adjust the raster centering again.

10. RASTER ROTATION ERROR

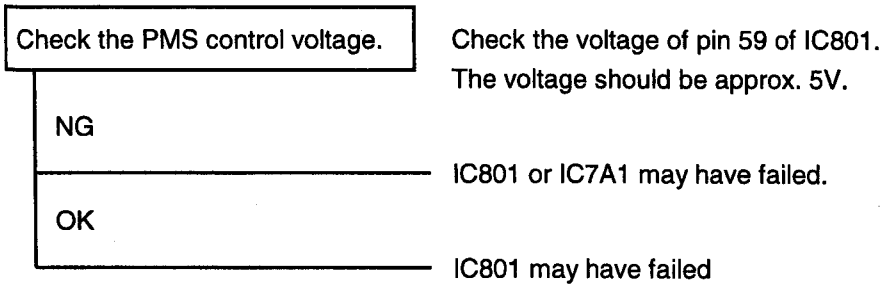

Check +15/−15V line
Check the voltage at CN-D2 pin 1 (+14.6V) and pin 3 (-15.6V) on the INLET PWB (PWE-551A).
NG
Check SW REG circuit. (see item 13)
Or CN-D2 failure.
OK
Check +5V line
Check the voltage at CN-PU1 pin 2..
NG
LC76P on the VIDEO PWB (PWE-549A) failure.
Or CN-PU1 failure.
OK
Check if Z-DY voltage varies by OSM rotate control
Measure the voltage at IC4M1 pin 14 on the INLET PWB (PWE-551A).
Normally, the voltage varies from approx. 0V to 5V.
NG
Digital control circuit failure (see item 12)
OK
IC4K1 on the INLET PWB (PWE-551A) or its ambient circuit failure.
Z DY (rotation coil) failure

11. POWER MANAGEMENT SYSTEM (PMS) FAILURE

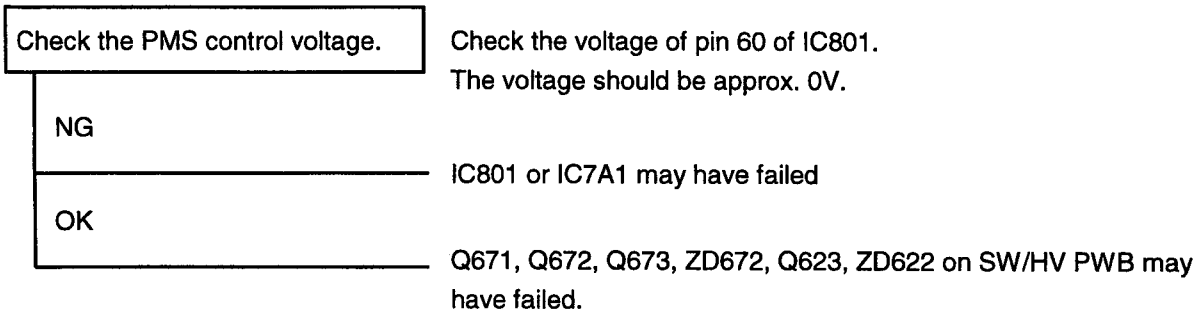
11-1. PMS FAILURE 1(When a monitor receives Horizontal and Vertical Sync.)


Check the color of power LED.
Green
OK
Yellow
Check the signal
Check OSM MENU is displayed and its frame color is cyan
NG
Press "EXIT" switch twice then OSM MENU disappears if its background color is RED.
If OSM MENU is not displayed, IC801 or IC7A1 on VIDEO PWB may have failed.
OK
Check the voltage
The signal of IC801 pin 59 on the VIDEO PWB should be approx. 5V.
OK
Q101 or Q102, Q103, Q104 or LED111 may have failed
NG
IC801 or IC7A1 may have failed.
Orange
Check the 220V line.
Measure the voltage between point "K1" and Ground on the switching regulator circuit on the DEF PWB. This line should approx. 220V.
OK
Check the voltage
Check the voltage of pin 59 of IC801 on the VIDEO PWB.
It should be approx. 5V.
NG
IC801 may have failed.
OK
IC7A1 on VIDEO PWB or some of among Q101 or Q102, Q103, Q104 and LED111 may have failed
NG
IC801 may have failed.

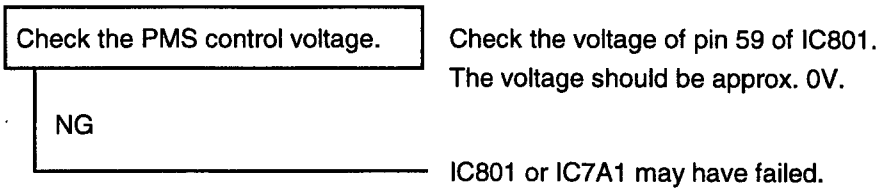
11-2. PMS FAILURE 2(When a monitor receives no Horizontal Sync)


Check the PMS control voltage.
Check the voltage of pin 59 of IC801.
The voltage should be approx. 5V.
NG
IC801 or IC7A1 may have failed.
OK
IC801 may have failed

11-3. PMS FAILURE 3(When a monitor receives no Vertical Sync)

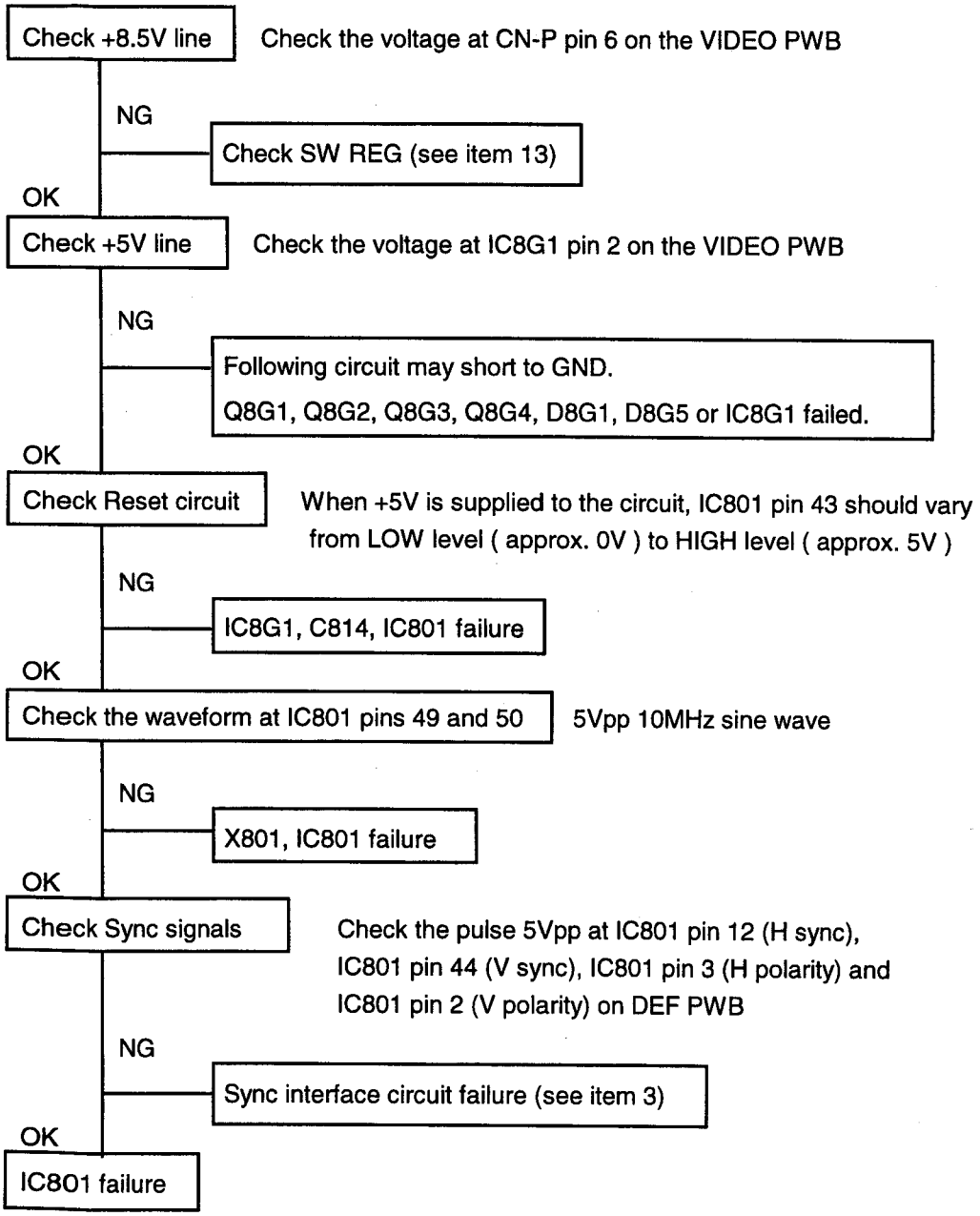

Check the PMS control voltage.
Check the voltage of pin 60 of IC801.
The voltage should be approx. 0V.
NG
IC801 or IC7A1 may have failed
OK
Q671, Q672, Q673, ZD672, Q623, ZD622 on SW/HV PWB may have failed.

11-4. PMS FAILURE 4(When monitor receives neither Horizontal nor Vertical Sync)

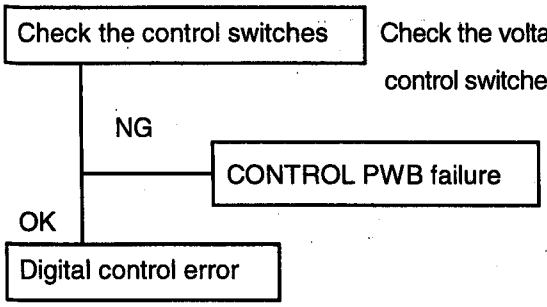

Check the PMS control voltage.
Check the voltage of pin 59 of IC801.
The voltage should be approx. 0V.
NG
IC801 or IC7A1 may have failed.

12. DIGITAL CONTROL CIRCUIT FAILURE

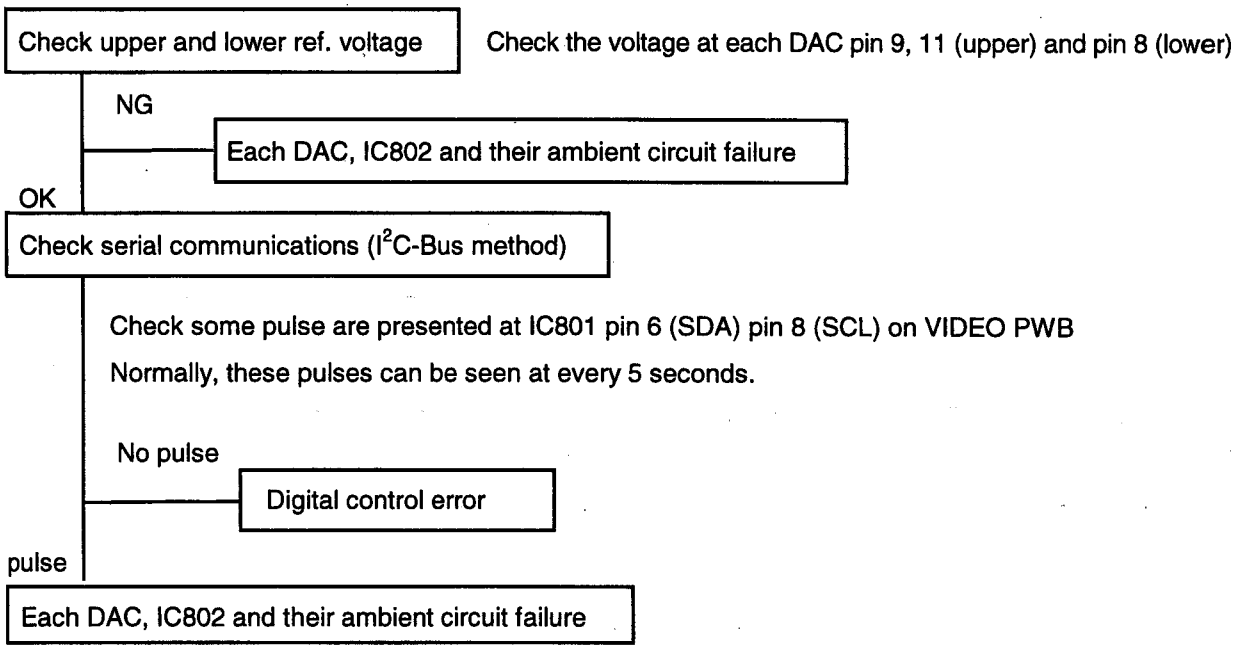
12-1. Digital control error


Check +8.5V line
Check the voltage at CN-P pin 6 on the VIDEO PWB
NG
Check SW REG (see item 13)
OK
Check +5V line
Check the voltage at IC8G1 pin 2 on the VIDEO PWB
NG
Following circuit may short to GND.
Q8G1, Q8G2, Q8G3, Q8G4, D8G1, D8G5 or IC8G1 failed.
OK
Check Reset circuit
When +5V is supplied to the circuit, IC801 pin 43 should vary from LOW level (approx. 0V) to HIGH level (approx. 5V)
NG
IC8G1, C814, IC801 failure
OK
Check the waveform at IC801 pins 49 and 50
5Vpp 10MHz sine wave
NG
X801, IC801 failure
OK
Check Sync signals
Check the pulse 5Vpp at IC801 pin 12 (H sync), IC801 pin 44 (V sync), IC801 pin 3 (H polarity) and IC801 pin 2 (V polarity) on DEF PWB
NG
Sync interface circuit failure (see item 3)
OK
IC801 failure

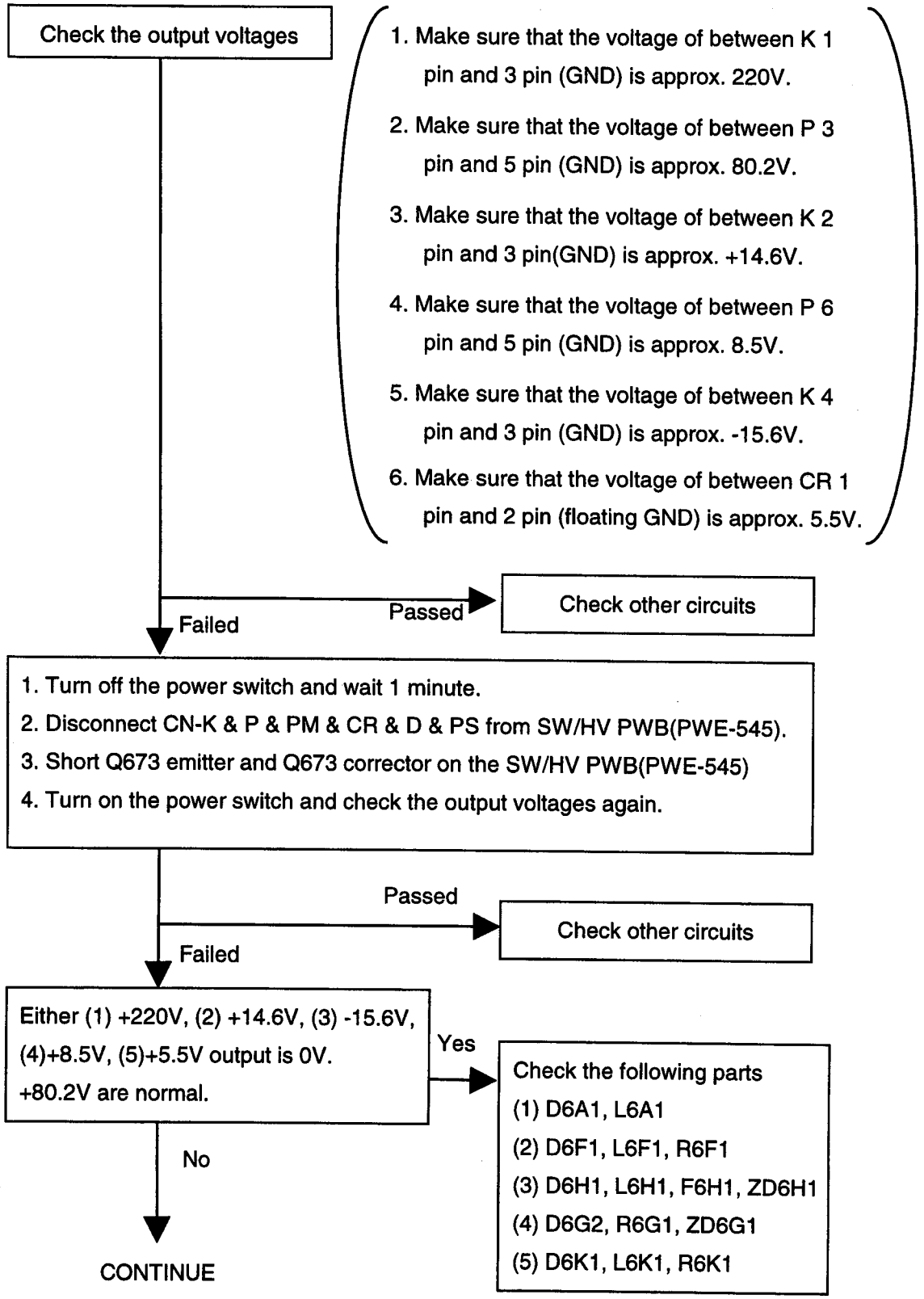
12-2. User control error

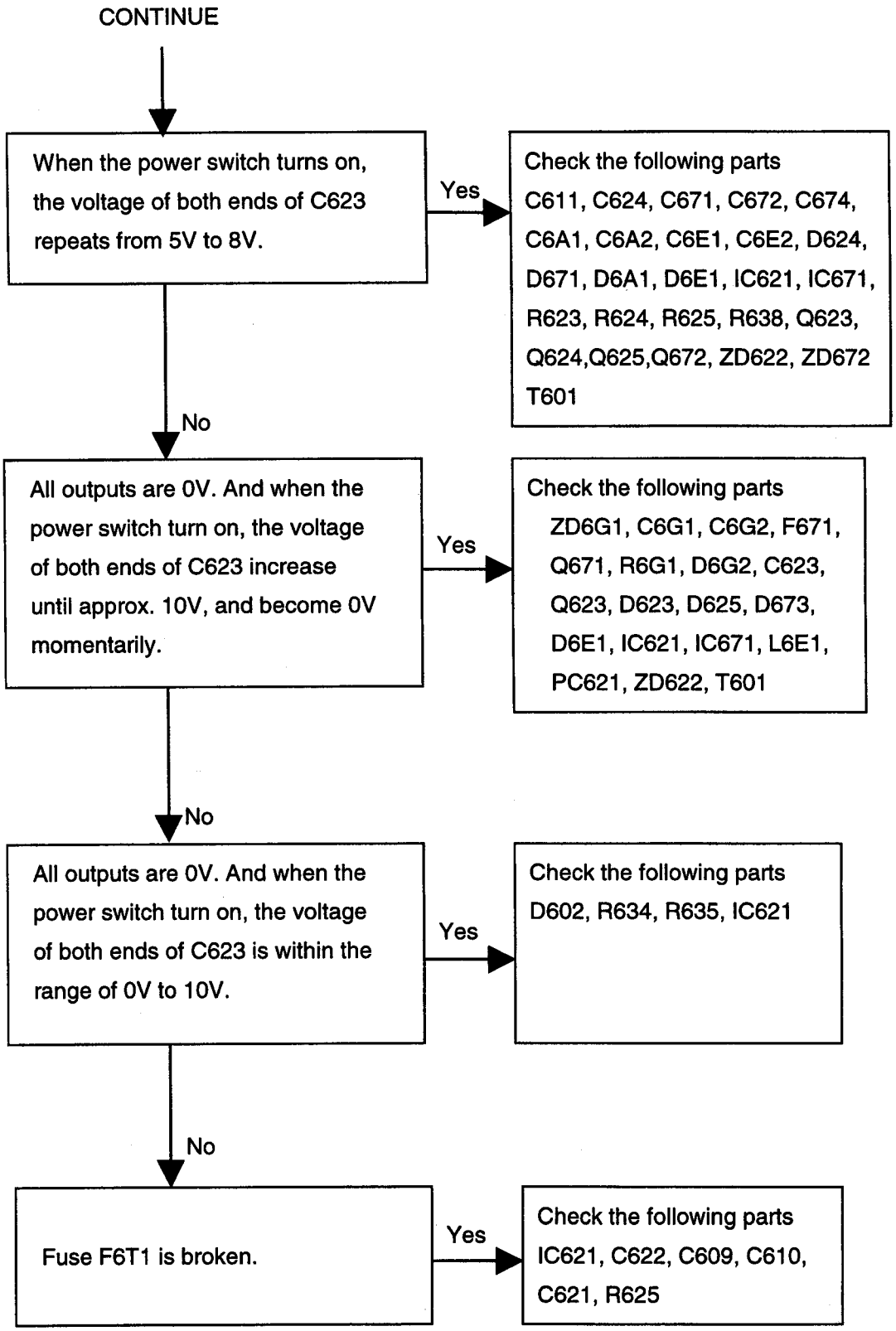

Check the control switches
Check the voltage at CN-CL pin 3 to 9 on VIDEO PWB when push the User control switches.
NG
CONTROL PWB failure
OK
Digital control error

12-3. DAC output error


Check upper and lower ref. voltage
Check the voltage at each DAC pin 9, 11 (upper) and pin 8 (lower)
NG
Each DAC, IC802 and their ambient circuit failure
OK
Check serial communications (I2C-Bus method)
Check some pulse are presented at IC801 pin 6 (SDA) pin 8 (SCL) on VIDEO PWB
Normally, these pulses can be seen at every 5 seconds.
No pulse
Digital control error
pulse
Each DAC, IC802 and their ambient circuit failure

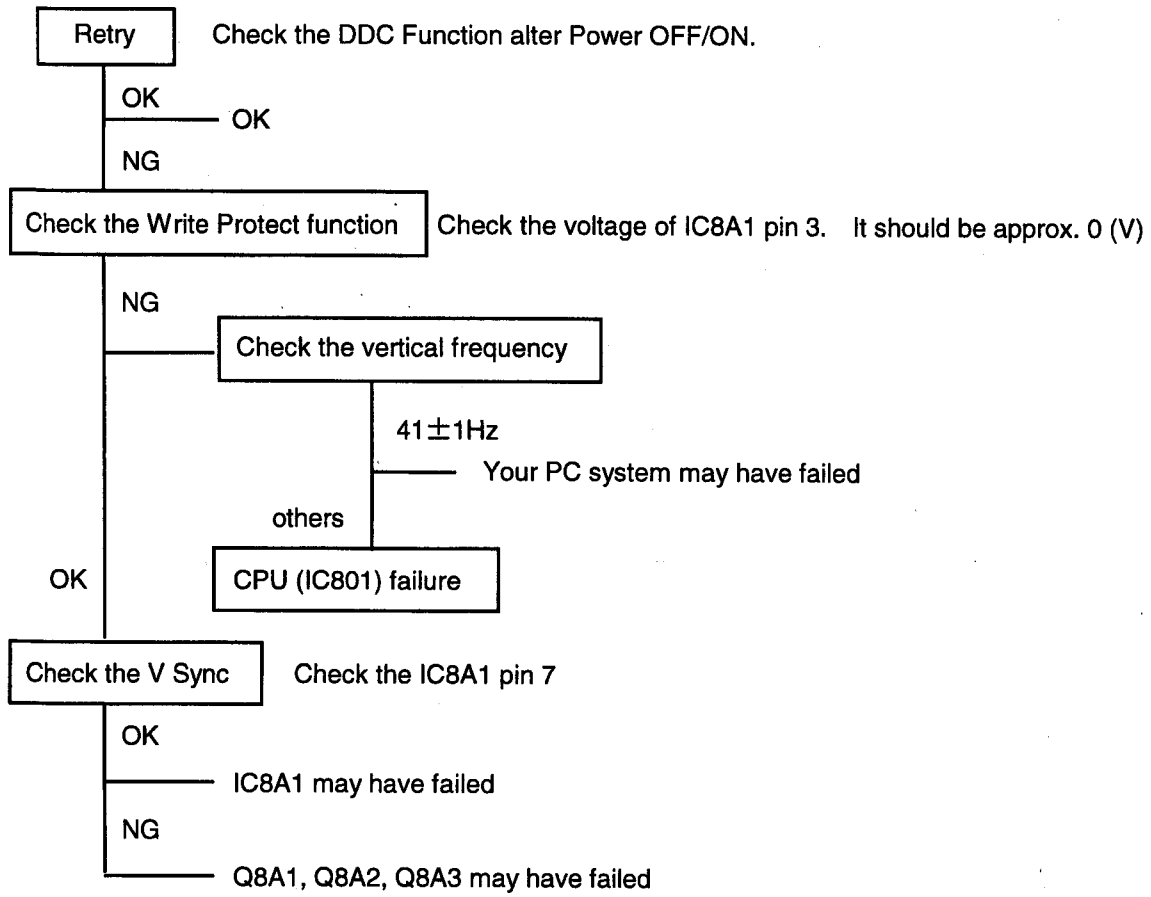
13. SWITCHING REGULATOR CIRCUIT FAILURE


Check the output voltages
1. Make sure that the voltage of between K 1 pin and 3 pin (GND) is approx. 220V.
2. Make sure that the voltage of between P 3 pin and 5 pin (GND) is approx. 80.2V.
3. Make sure that the voltage of between K 2 pin and 3 pin(GND) is approx. +14.6V.
4. Make sure that the voltage of between P 6 pin and 5 pin (GND) is approx. 8.5V.
5. Make sure that the voltage of between K 4 pin and 3 pin (GND) is approx. -15.6V.
6. Make sure that the voltage of between CR 1 pin and 2 pin (floating GND) is approx. 5.5V.
Passed
Check other circuits
Failed
1. Turn off the power switch and wait 1 minute.
2. Disconnect CN-K & P & PM & CR & D & PS from SW/HV PWB(PWE-545).
3. Short Q673 emitter and Q673 corrector on the SW/HV PWB(PWE-545)
4. Turn on the power switch and check the output voltages again.
Passed
Check other circuits
Failed
Either (1) +220V, (2) +14.6V, (3) -15.6V, (4)+8.5V, (5)+5.5V output is 0V. +80.2V are normal.
Yes
Check the following parts
(1) D6A1, L6A1
(2) D6F1, L6F1, R6F1
(3) D6H1, L6H1, F6H1, ZD6H1
(4) D6G2, R6G1, ZD6G1
(5) D6K1, L6K1, R6K1
No
CONTINUE

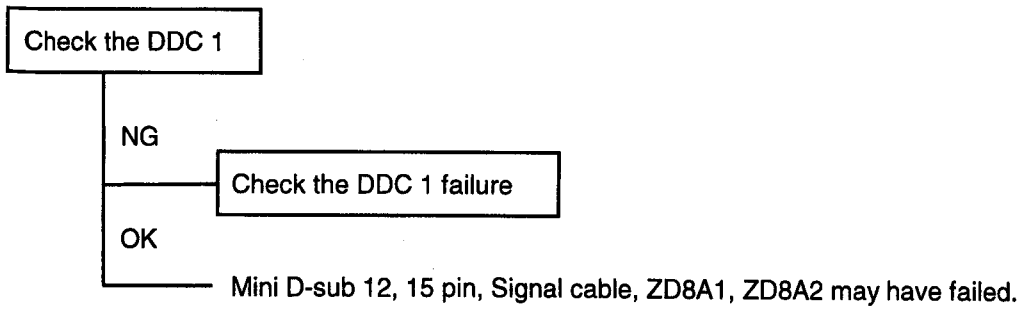

CONTINUE
When the power switch turns on, the voltage of both ends of C623 repeats from 5V to 8V.
Yes
Check the following parts C611, C624, C671, C672, C674, C6A1, C6A2, C6E1, C6E2, D624, D671, D6A1, D6E1, IC621, IC671, R623, R624, R625, R638, Q623, Q624,Q625,Q672, ZD622, ZD672 T601
No
All outputs are 0V. And when the power switch turn on, the voltage of both ends of C623 increase until approx. 10V, and become 0V momentarily.
Yes
Check the following parts ZD6G1, C6G1, C6G2, F671, Q671, R6G1, D6G2, C623, Q623, D623, D625, D673, D6E1, IC621, IC671, L6E1, PC621, ZD622, T601
No
All outputs are 0V. And when the power switch turn on, the voltage of both ends of C623 is within the range of 0V to 10V.
Yes
Check the following parts D602, R634, R635, IC621
No
Fuse F6T1 is broken.
Yes
Check the following parts IC621, C622, C609, C610, C621, R625

14. PLUG & PLAY FAILURE

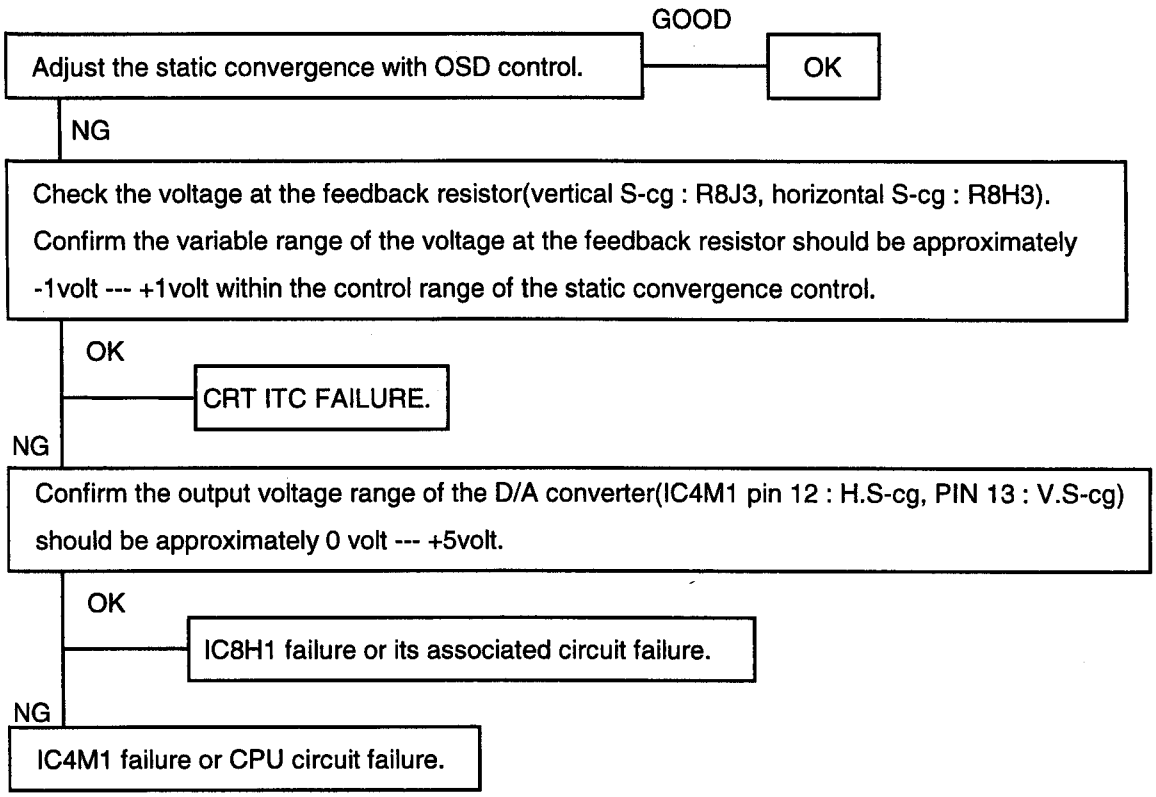
14-1. DDC 1 failure



14-2. DDC 2B failure



15. Out of Cg-specification


GOOD
Adjust the static convergence with OSD control.
OK
NG
Check the voltage at the feedback resistor(vertical S-cg : R8J3, horizontal S-cg : R8H3).
Confirm the variable range of the voltage at the feedback resistor should be approximately
-1volt --- +1volt within the control range of the static convergence control.
OK
CRT ITC FAILURE.
NG
Confirm the output voltage range of the D/A converter(IC4M1 pin 12 : H.S-cg, PIN 13 : V.S-cg)
should be approximately 0 volt --- +5volt.
OK
IC8H1 failure or its associated circuit failure.
NG
IC4M1 failure or CPU circuit failure.

CIRCUIT DESCRIPTION

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1. VIDEO CIRCIT

1) Video Signal Amplification Section

The video signal amplification section basically consists of the input section circuit and the amplification circuit. Each Red(R), Green(G) and Blue(B) video signal circuit is identical to each other, the G circuit being described below.

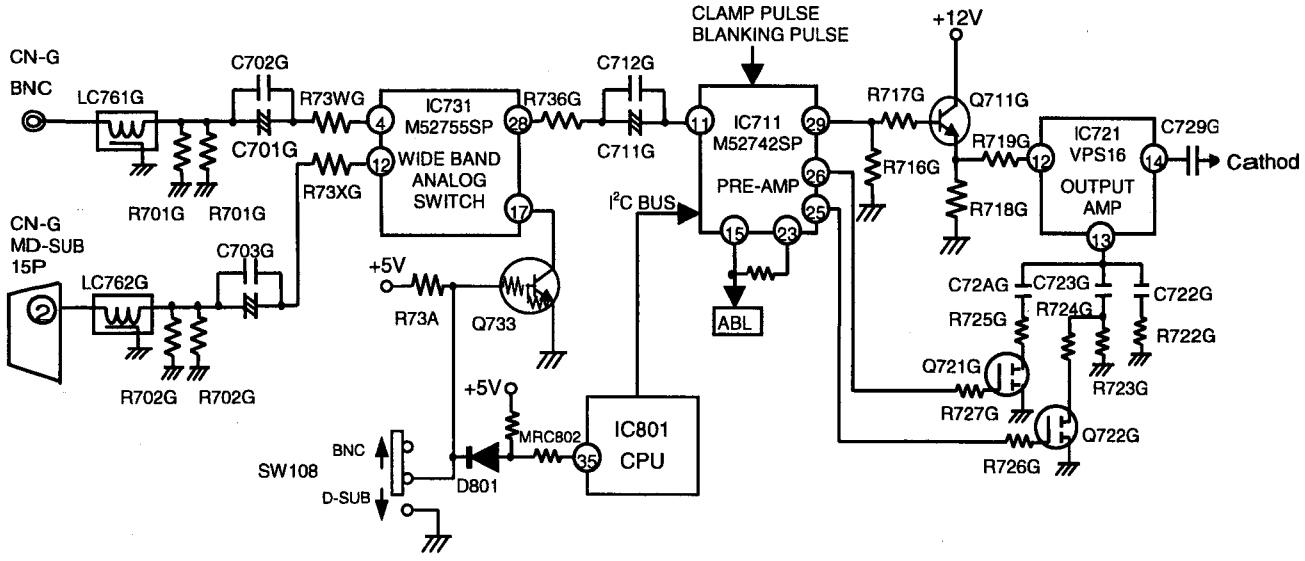
The input selection circuit selects the BNC input or D-SUB input according to the voltage of IC731 pin 17 (open or 0V). IC731 pin 17 voltage changes when SW108 changes and Q733's condition becomes ON or OFF. CPU detects BNC/D-SUB inputs and memories CONTRAST, SHARPNESS and EDGELOCK condition each input.

The amplification circuit is constructed with IC711(Pre-amp), Q711G(buffer), IC721(Output amp).

IC711 controls CONTRAST and R/G/B GAIN with I^2C BUS by CPU. Only ABL function is controlled by external DC voltage. IC711 is possible to change gain, it is approx.4.3 after the video adjustment.

The output of IC711 is buffered by Q711G and fed to IC721(Output amp).IC721's gain is fixed approx.15.

Rs and Cs connected IC721 pin 13 form emitter peaking. Emitter peaking effect changes 4 levels by Q721G and Q722G.



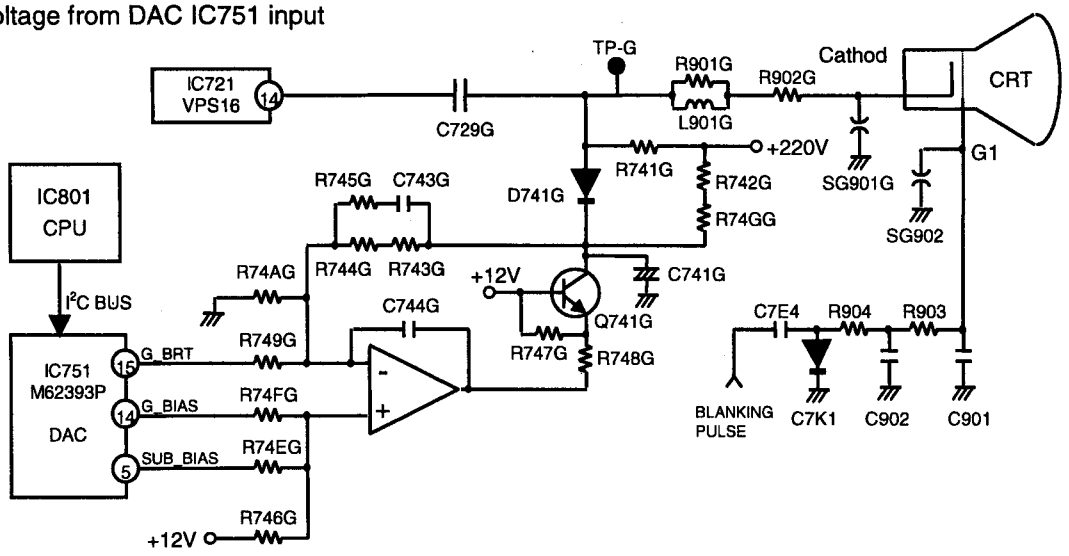
(Fig 1.1) Video Amplification Circuit

2) Video Bias Circuit

The video signal is amplified maximum 45Vpp in IC721 output, then the signal is done DC bias by video bias circuit through C729G. This DC voltage varies when cut off adjustment and brightness adjustment.

The video bias circuit consists of fixed voltage circuit construction with op-amp. Q741G is used high-voltage transistor due to get approx.80V to 170V at cathode black level voltage.

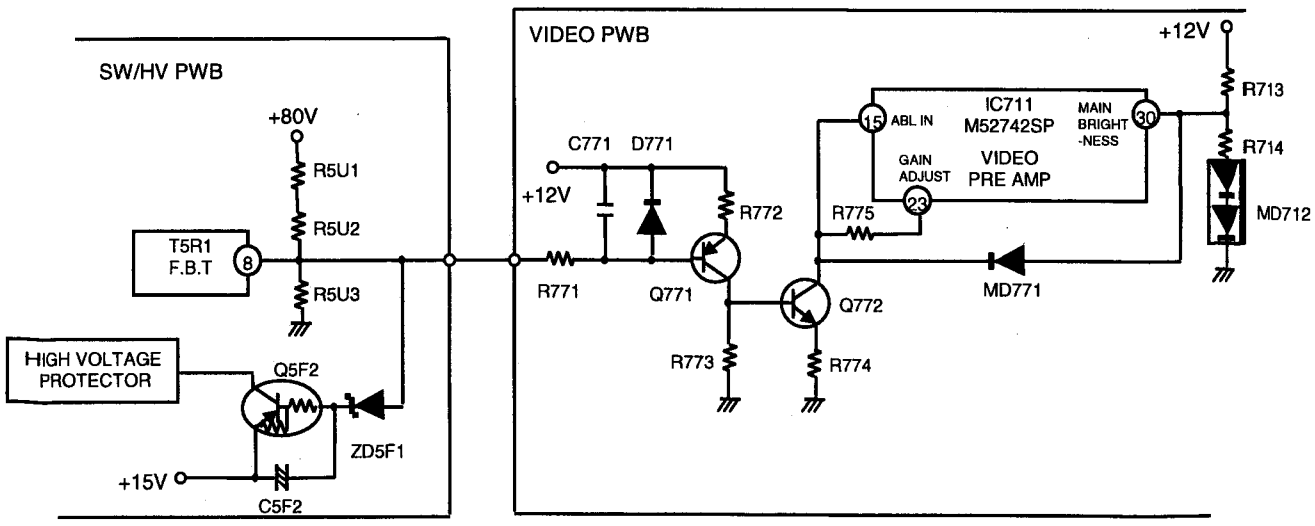
The voltage from DAC IC751 input



(Fig 1.2) Brightness and Cut-off Control

3) ABL Circuit

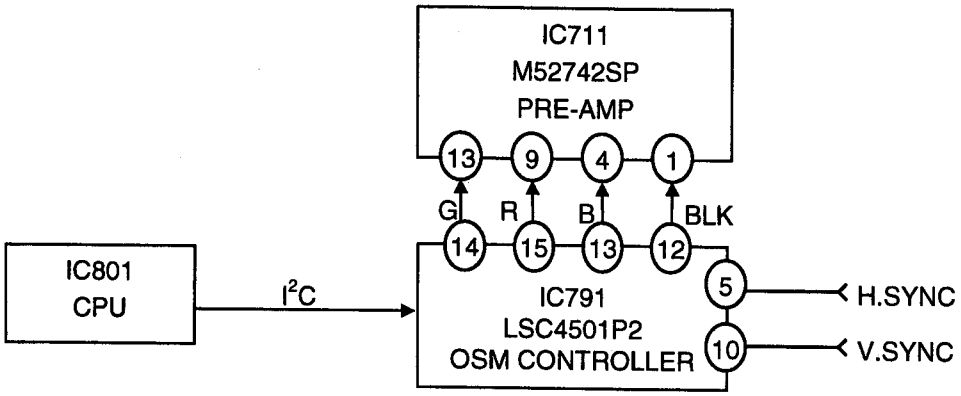
The ABL circuit consists of the part (Q771,Q772 and peripherals) which detects and amplifies the current flowing to the CRT anode, and the other parts (IC711) which control the gain of the video signal (R,G and B). The ABL circuit limits the amplitude of the video signal and serves to keep the maximum average current flowing to the CRT up to 750 μA. When the anode current is less than 750 μA, Q772 does not operate. And the anode current attempts to exceed 750 μA, Q772 operates and the voltage of IC711 pin 15 drops, the gain of IC711 drops. After saturation of IC711 pin 15, MD711 becomes ON, then IC711 pin 30 drops. This is the voltage that decides the black lebel of IC711 video output. Therefore back raster becomes dark.



(Fig 1.3) ABL Circuit

4) On Screen Manager (OSM)

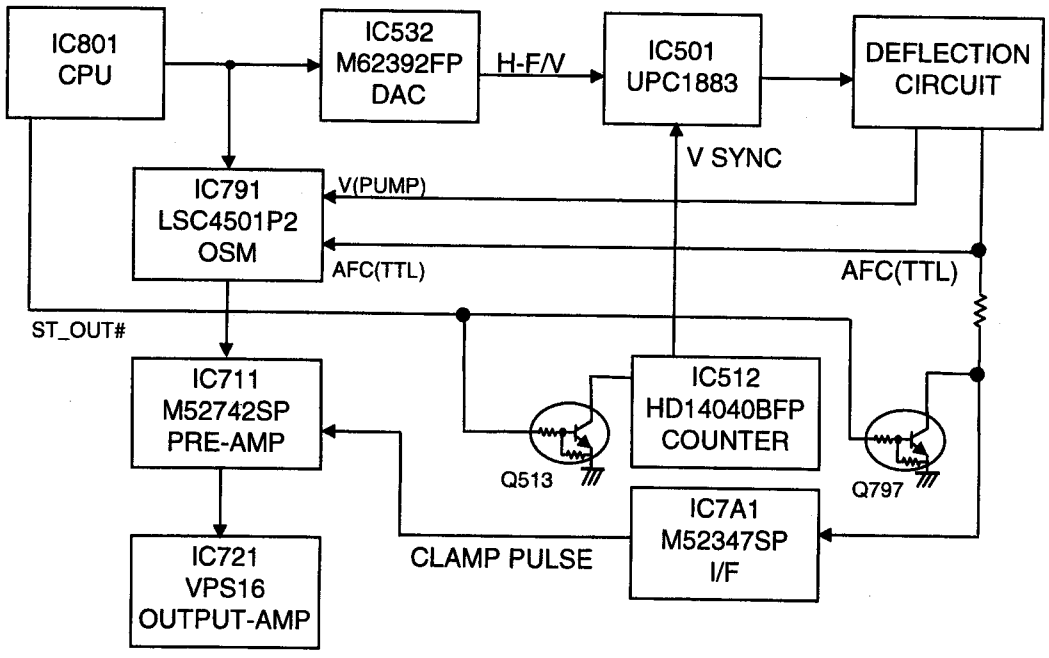
The OSM circuit consists of IC791(OSM controller) and IC711(Pre-amp) which matrix the video signal and the OSM signal. IC791 receives the display data from IC801(CPU), and the signal outputs R, G, B and Blanking are fed out of pins 15, 14, 13 and 12 respectively. The OSM signals are mixed with video signals in IC711(Pre-amp). The OSM screen brightness is controlled by I^2C BUS from CPU.



(Fig 1.4) On Screen Manager

5) Self Test

To activate the self test function, power on the monitor while holding down the RESET switch. When the self test mode is activated, IC532(DAC) is controlled by IC801(CPU) to generate the voltage which makes IC501 to oscillate at 60.0KHz. Thus the horizontal deflection circuit and the high voltage circuit operate at this frequency. When Q513 and Q797 is turned off by ST_OUT signal from IC801(CPU). The pseudo vertical sync signal count down from the horizontal sync signal with IC512 is effective, and the shape AFC pulse are fed to IC791 and IC7A1, the clamp pulse for IC711 is generated by IC7A1. The video signal is generated by IC791, and fed to IC721(Output amp) via IC711(PRE-AMP).



(Fig1.5) Self Test

2. DEFLECTION CIRCUITS

2-1. HORIZONTAL DEFLECTION CIRCUIT

1) Horizontal Oscillation Circuit

The control of the horizontal oscillation and horizontal image position is done by IC501 on the OSC PWB (PWE-550A).

The IC501 controls the following circuits as its internal functions.

①1st delay circuit
②H-width circuit
③F/V delay circuit
④FBP delay circuit
⑤AFC circuit
⑥Horizontal duty control circuit
⑦Horizontal oscillation circuit (H-OSC)
⑧Horizontal Image Phase Shifter Circuit

① 1st delay circuit

The horizontal sync signal output from IC7A1 pin 15 on the VIDEO PWB is fed to pin 26 of IC501.

The horizontal sync signal input from pin 26 is delayed by this circuit.

The output signal delay is controlled by the input voltage of pin 25.

② H-width circuit

The output signal of 1st delay is converted to the fixed pulse width signal (the Horizontal dummy sync signal) by this circuit.

The duty cycle of the pulse is fixed to 10 %.

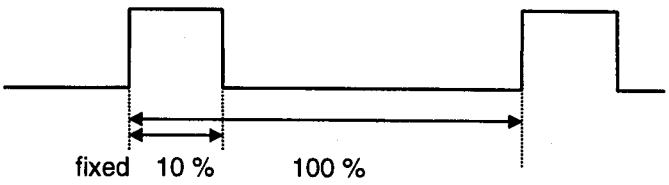


Fig. 2.1

③ F/V delay circuit

This circuit is an VCO(Voltage Control Oscillator).

An oscillator frequency is controlled by the input voltage of pin 19.

The control characteristic of the input voltage of pin 19 vs. an oscillator frequency is Fig. 2-2.

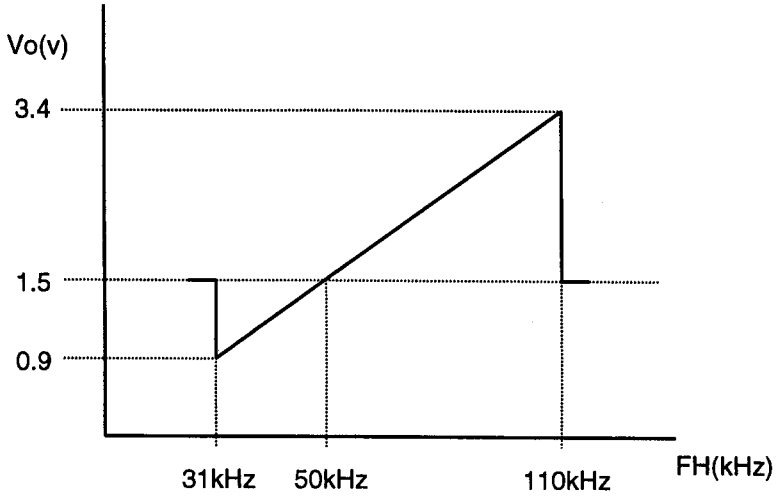


Fig. 2.2

④FBP delay circuit

The FBP pulse input from pin 17 is delayed by this circuit and then it is supplied to AFC circuit.

The duty cycle of the FBP pulse is fixed to 30 %.

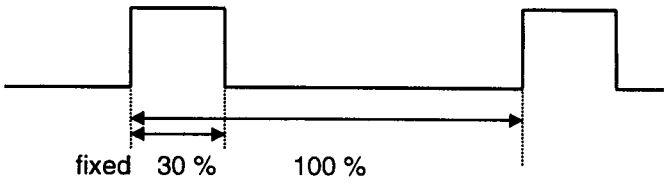


Fig. 2.3

⑤AFC circuit

The AFC circuit detects the phase error between the horizontal dummy sync signal and FBP pulse input from pin 17 and uses this error voltage to control the horizontal oscillation.

⑥Horizontal duty control circuit

The horizontal drive pulse is output from pin 18 and then supplied to the horizontal drive circuit.

The duty of horizontal drive pulse is controlled by the voltage of pin 23 to make the ratio approximately 50% regardless of the oscillation frequency.

⑦Horizontal oscillation circuit (H-OSC)

The horizontal sync signal output from of IC7A1 pin 15 on the VIDEO PWB is fed to IC501 pin 26 on DEF PWB. Horizontal oscillation frequency is determined by the voltage applied to pin 19 and the current flowing out of pin 20.

The pulse (approx. 8Vp-p) at the pin which its frequency is same as that of input sync signal, is output and applied to horizontal drive circuit. The duty cycle of the output pulse is regulated to approx. 50 % by the voltage applied to pin 23.

⑧Horizontal Image Phase Shifter Circuit

The horizontal position of the picture is controlled by horizontal sync signal in which the 1st delay output signal is generated by charging and discharging the internal capacitor and FBP input and FBP delay output wave form is generated by charging and discharging the internal capacitor. Therefore by varying the 1st delay quantity with the DC voltage applied to pin 25, the position of the picture is controlled.

2) Distortion Correction Circuit

①Side Pincushion and Vertical Trapezoid Distortion Correction Circuit

The parabolic wave form that is the side pincushion and trapezoid distortion correction wave form output from IC501 pin 10 is supplied to the horizontal size modulation circuit on the DEF PWB. Its amplitude is controlled by side pincushion distortion correction, control voltage input to pin 3, and its bias is controlled by vertical trapezoid distortion control voltage input to pin 2 of IC501.

②Parallelogram Distortion Correction Circuit

The saw tooth wave form output from IC501 pin 28 is controlled by DC voltage input to pin 4. Parallelogram distortion is corrected by this wave form input to pin 25(1st delay terminal) through C52E. When DC voltage input to pin 4 is approximately 2.5V, corrective value is 0V.

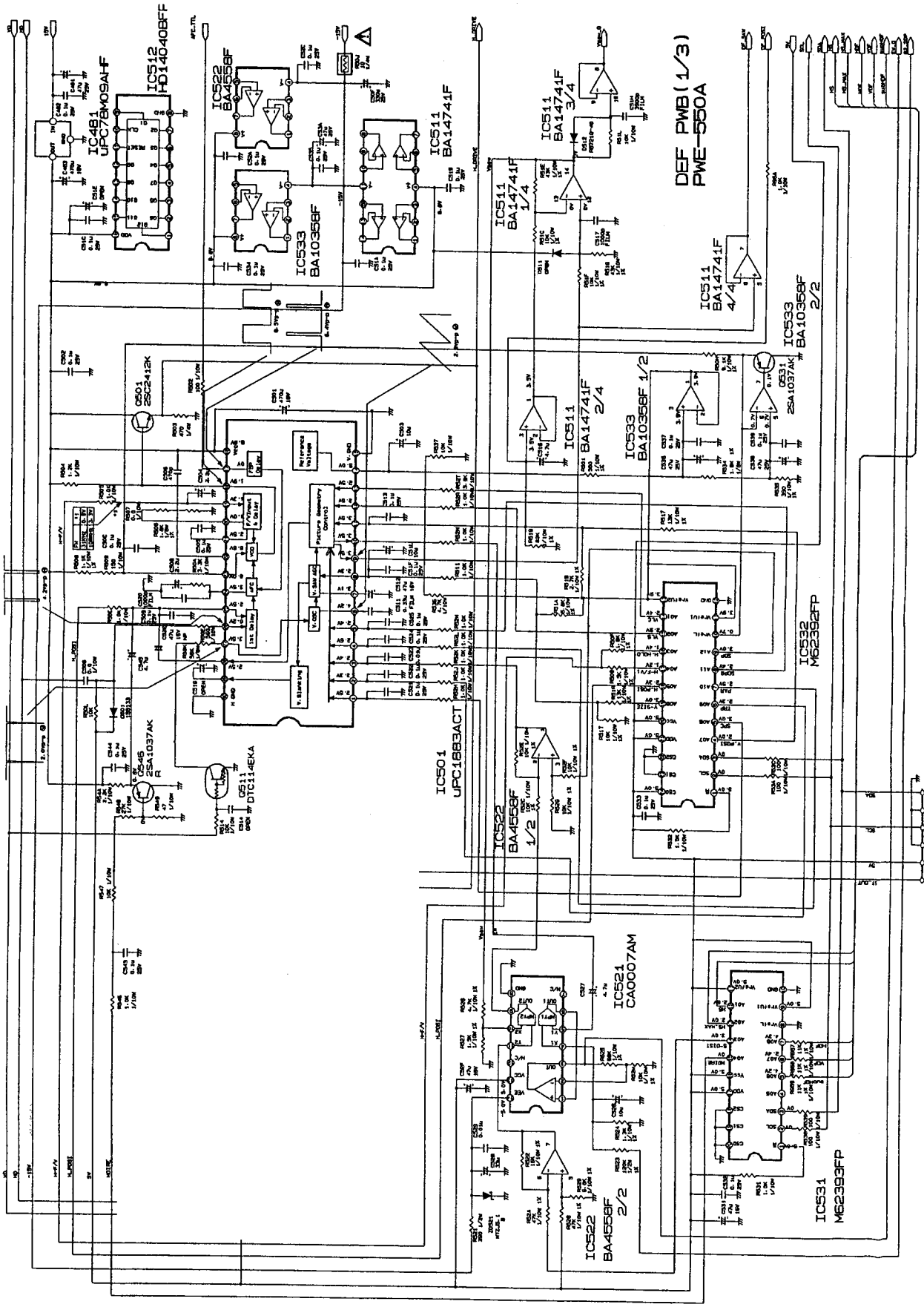

DEF PWB(1/3)
PWE-550A
IC512
HD14040BFF
IC481
uPC78M09AHF
IC522
BA4558F
IC533
BA10358F
IC511
BA14741F
IC501
uPC1883ACT
IC521
CA0007AM
IC531
M62393FP
IC532
M62392FP
Q501
2SC2412K
Q545
2SA1037AK
Q511
DTC114EKA

Fig. 2.4

3) Horizontal Drive Circuit

The horizontal drive system uses what is generally referred to as a flyback system.
The horizontal drive pulse output from IC501 pin 18 switches Q555 on and off.
It is amplified by T551 and switches Q561 (the horizontal output transistor) on and off.
The voltage of C552 for horizontal drive is fixed at 15V.

4) Horizontal Deflection Output Circuit

It corrects the optimum horizontal linearity by using Linear-coil and S correction capacitor to change the horizontal frequency mode. Horizontal frequency mode is shown in CPU CIRCUIT description section. Linear-coil of L571 changes at threshold of 49kHz and 82.6kHz.

5) Horizontal Size Control Circuit

Horizontal size is controlled by power-supply voltage for a horizontal deflection made using PWM method. The horizontal size is controlled by two methods. One is H-SIZE which can be adjusted with a user menu, and the other is H-SIZE MAX which can be adjusted only with a service menu. The horizontal size control circuit consists of the circuit shown in the following.

- Saw-tooth-wave form generator
- Switching pulse generator
- PWM Chopper
- +B modulation circuit

A saw-tooth wave form is generated inside IC592 . Its frequency is depend on horizontal drive pulse signal input at pin 8 and its slope is decided by the time constant of R59J and C598. The waveform can be monitored at pin 3.
Horizontal size control voltage is compared with reference voltage from pin 6 of IC592, output is fed into pin1 of IC592. On the other hand, horizontal maximum size control voltage is compared with AFC feedback voltage and then output is fed to a buffer circuit inside IC592 at pin5 and output at pin4 of IC592.
These 2 comparing voltages that are inputted at pin 1 and 13 shall be compared within IC592 as well as feedback from output voltage of PWM chopper circuit. Output of comparison is the voltage that controls the duty cycle of square wave that generated from saw-tooth waveform. Square wave is buffered and output at pin 9 of IC592 to the gate of Q5G1,PWM modulation.
Source voltage (220V) of Q5G1 is converted into horizontal deflection voltage by the duty cycle of the square wave. This voltage is supplied to a horizontal size modulation circuit consists of Q5A1, R5A1, R5A2, C5A1, C5A2, and ZD5A1. Transistor Q5A1 modulates chopper DC output voltage from L5G2, C5G3. Self bias voltage by R5A1 and R5A2 , and a modulation wave form(E/W parabolic wave form) is applied to a base through C5A3. A modulation wave form is made in the distortion correction circuit described in below section

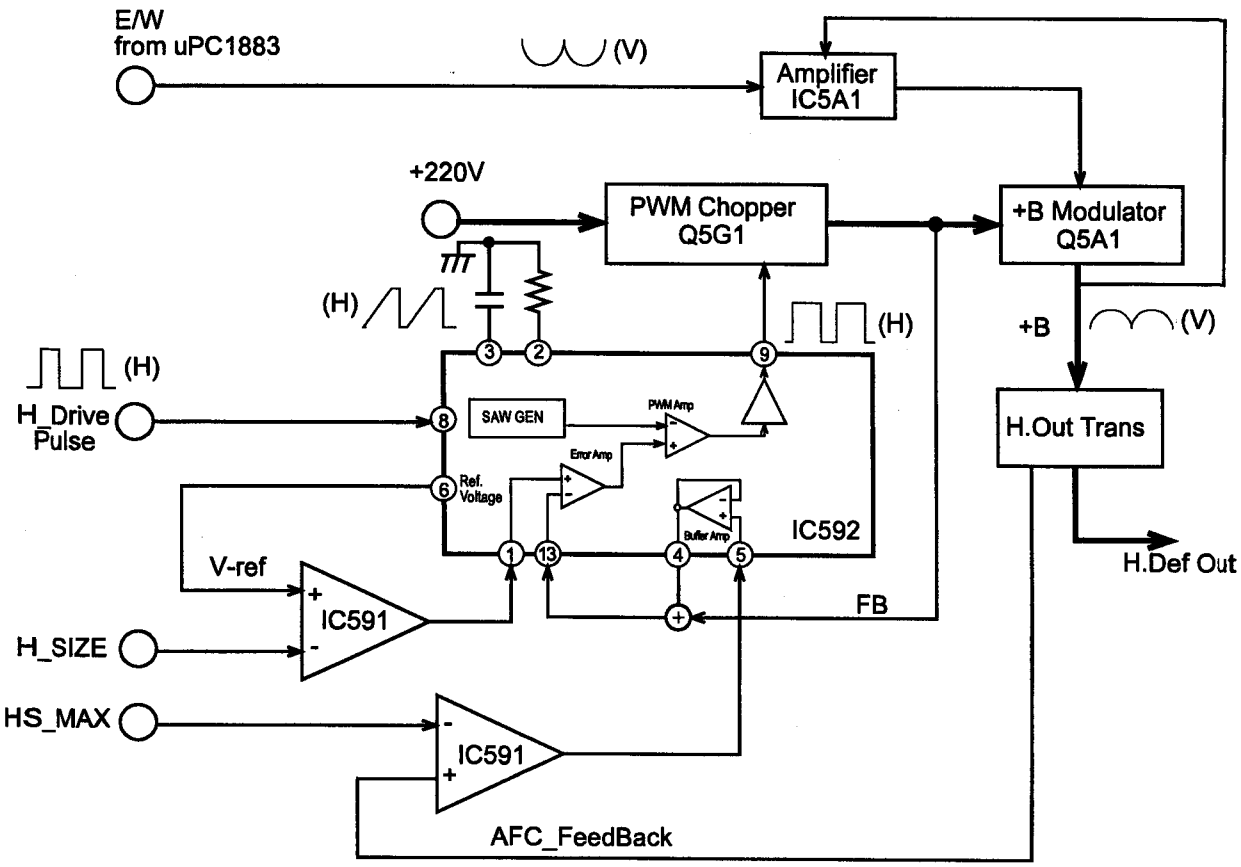


Fig. 2.5 HORIZONTAL SIZE CONTROL CIRCUIT

① Horizontal size modulation circuit

The transistor Q5A1modulates the Chopper output voltage that location is C5G3. This transistor is biased by R5AC and R5AE and the modulation wave is added to the base through C5A6. The modulation wave is made by Horizontal size correction circuit which is described below section 6).

② User H SIZE control

OSM control for users vary from 0 to 255. At this time, the voltage of IC531 pin 12 (HS control line) vary from 5V to 0.7V, and the voltage of IC591 pin 10 vary from approximately 3V to 4V.
The horizontal video size reduces as much as approximately 77% irrespective of the horizontal frequency when the maximum size is taken to 100%.

③ H SIZE MAX control

The H SIZE MAX control is accessible in service mode only, and this control sets the maximum horizontal size. The H SIZE for user control vary from the horizontal maximum size which is adjusted at this stage to less than the H SIZE MAX. H SIZE MAX control vary from 0 to 255 on OSM menu, and the voltage of IC531 pin 13 output voltage vary from approximately 0.7V to 5V. The horizontal maximum size control voltage (HS_MAX)is output to IC591 pin 13 and is compared to the corrected AFC pulse voltage (IC591 pin 12) . The HS_MAX output voltage is converted to slice voltage at the comparator for PWM control which is input to error amplifier IC592 pin 5.

The H SIZE MAX has two area of memory(H SIZE MAX 1 and 2) which is selected by the below table.

H Frequency Range[KHz]	Selected Memory
95.0 - 110.0	H SIZE MAX 2
82.0 - 95.0	H SIZE MAX 2
69.0 - 82.0	H SIZE MAX 2
57.0 - 69.0	H SIZE MAX 2
49.0 - 57.0	H SIZE MAX 1
42.5 - 49.0	H SIZE MAX 1
36.5 - 42.5	H SIZE MAX 1
33.5 - 36.5	H SIZE MAX 1
30.8 - 33.5	H SIZE MAX 2

6) Distortion Correction Circuit

The distortion correction circuit creates a distortion correction signal to reduce the geometric distortion intrinsic in the CRT, and this signal is modulated by the phase and deflection circuit. The correction wave is generated inside IC501 ; uPC1883 on the OSC PWB. The distortion correction wave is roughly divided into horizontal size and horizontal phase circuit.

① Horizontal Size correction Circuit

- Side pin correction (SDP)
- Trapezoid correction (TRP)
- Corner distortion correction (CORNER)

When the user performs the OSM menu of geometric horizontal frequency system correction, the input voltage of IC501 pin 3, pin 2, and pin 1 vary the a range of 1V to 4V. After computation inside the IC, the correction wave of the computation results is output to pin 10 SDP. Then this wave form amplitude is controlled by +B-feedback . This control is performed in the multiplier (IC4A1). The output amplitude of IC4A1 pin 6 is half as much as multiple pin 5 SDP by pin 4 voltage. Following this output is added to the horizontal size modulation section, and finally it is applied to the raster correction.

· S. distortion correction (S WAVE)

The vertical saw wave is input to IC521 10pin. IC521 controls this signal amplitude by 11pin input voltage. The output signal of IC521 9pin is added to the side pincushion control voltage by IC522, then the output signal of IC522 1pin controls IC501 3pin. S. distortion is controlled by IC531 14pin voltage.

② Horizontal Phase correction Circuit

- Side pin balance correction (SDPB)
- Parallelogram correction (PAR)

Similarly, when the user performs the geometric horizontal phase system correction, the input voltage of IC501 pin 5 (SDPB) and pin 4 (PAR) varies in a range of 1V to 4V. Inside the IC, the correction wave of the computation results is output to pin 28 (HPDO). The correction wave is added to the DC voltage of pin 25 (HP), and phase correction using the IC501 horizontal delay function is performed.

7) Rotation Correction Circuit

Raster rotation is corrected by moving the electron beam in the magnetic field produced by current applied to the Z-coil. The amount of correction is proportional to the current applied to the Z-coil and the correction can be adjusted with the control voltage (DC) of the D/A converter. The DC voltage output from IC961(D/A converter) pin 4 generates current to flow in the Z coil, and amount of rotation is determined. User can adjust the level of rotation by operating OSM menu(Rotate).

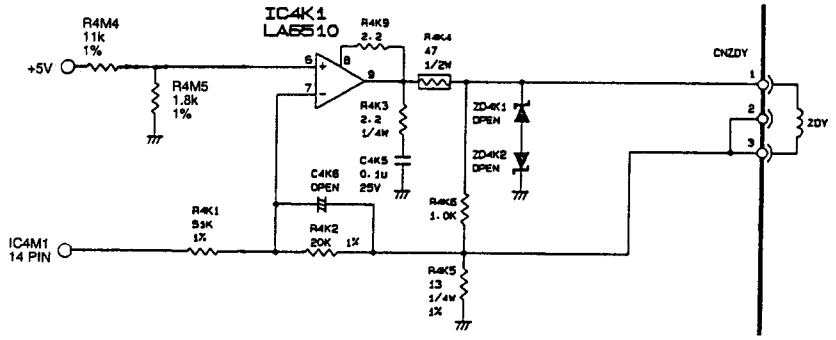


Fig. 2.6 Rotation Correction Circuit

8) H Centering Circuit

Switching regulator generates the floating 5 volts which is compared to the deflection circuit power supply voltage (high B+ voltage). This voltage is divided by VR581 (H centering) and is supplied to the base of Q584. The voltage differences of Q584's base and emitters is supplied to L583.

Horizontal centering is manipulated by the current supplied by L583 to the horizontal deflection circuit.

2-2. VERTICAL DEFLECTION CIRCUIT

The vertical deflection circuit consists of the following blocks:

1) Sawtooth Wave Form Generating and Wave Form Corrective Circuits
2) Vertical Raster Position Control Circuit
3) Vertical Output Amplifier Circuit

1) Sawtooth Wave Form Generating and Wave Form Corrective Circuits

The vertical sync signal from IC7A1 on VIDEO PWB (PWE-518A) is fed to IC501 pin 27 (uPC1883BCT) on OSC PWB (PWE-519A), so that the sawtooth wave form synchronized with the input signal is output from IC501 pin 9. The amplitude of sawtooth wave form is controlled by the voltage at IC501 pin 8. IC501 controls the amplitude which is constant and independent of frequency. In addition, the output sawtooth wave form of IC501 is corrected for vertical linearity. In IC501, square wave form and square wave form are added to sawtooth wave form to correct linearity. The amount of correction is controlled by the voltage applied to pins 8, 11, 12 and 13 (vertical size pin 8, vertical position pin 11, S correction pin 12 and C correction pin 13). The voltage at pins 12, 13 are D/A converter outputs. As result, the optimum linearity can be obtained even as the vertical size and vertical position are changed.

2) Vertical Raster Position Control Circuit

The vertical raster position is controlled by changing the amount of DC bias of the input signal to IC401. IC505 subtracts the voltage at IC501 pin 11(vertical position voltage) from the voltage at IC501 pin 9 (sawtooth wave form output), and the amount of DC bias of the input signal to IC401 is changed.

3) Vertical Output Amplifier Circuit

The current proportional to the input voltage to IC401 is supplied to the vertical deflection coil (V-DY). The vertical deflection current is taken as voltage wave form on R410 and fed back to IC401.

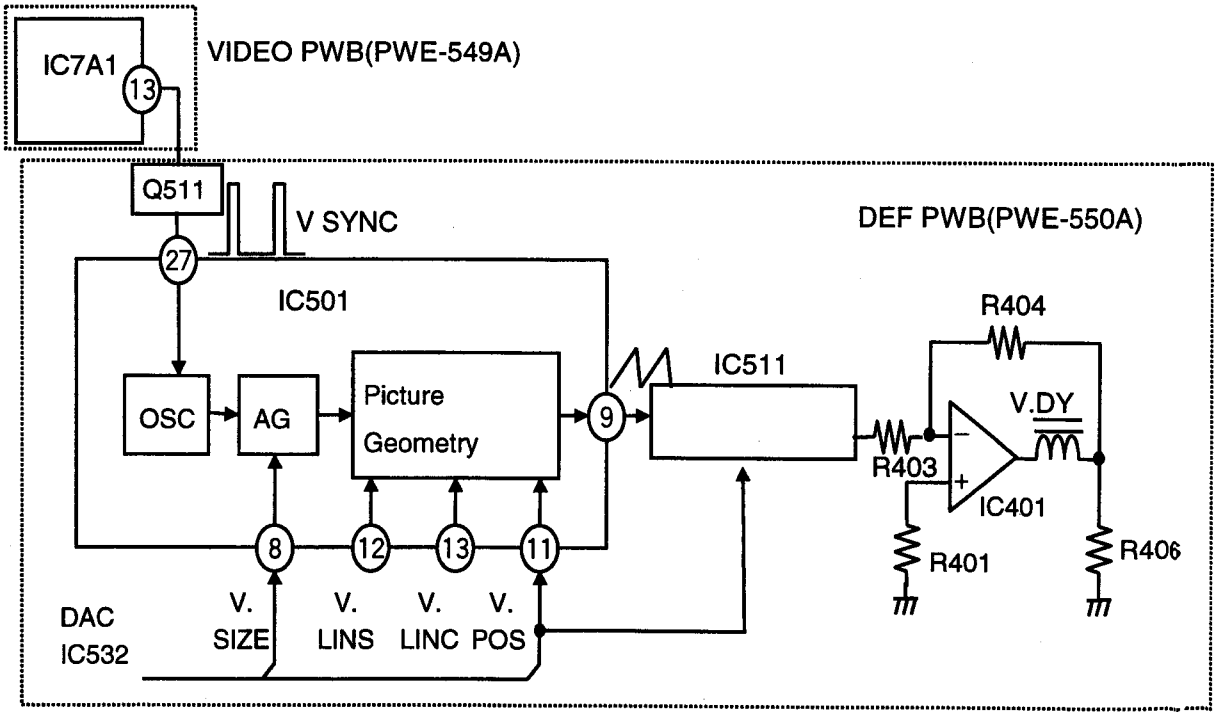


Fig. 2.7 Vertical Deflection Circuit

3. High Voltage Circuit

The high voltage circuit consists of the high voltage control circuit, and Q5R1 and its peripheral circuits made up for the high voltage output circuit and the high voltage protection circuit for instance of high voltages circuit irregular operation.

1) High Voltage Control Circuit

ICD5P1 is high voltage control integrated circuit.
The high voltage detection voltage is output to TP-HV from the FBT's internal bleeder resistor.
The AFC pulse output from the horizontal output transformer (T561) is input to 4pin of ICD5P1, and the sawtooth wave is generated in ICD5P1. This sawtooth wave is compared with the high voltage detection voltage and the drive pulse applied to the gate of Q5R1 is generated. This pulse width becomes narrower when the high voltage rises, and becomes wider when high voltage drops.

2) High Voltage Output Circuit

The output circuit operates depending on the drive pulse applied to the gate of Q5R1, and the fly-back pulse is produced at pin 1 of T5R1 (FBT) . The drive pulse width changes with respect to the high voltage fluctuation resulting from changes in the CRT beam current and operation frequency, the peak value of the corrector pulse changes, and high voltage stabilization is performed.

3) High Voltage Protector Circuit

This circuit consists of the X-ray protector which stops the operation of the control circuit when the high voltage rises abnormally, and the overcurrent protector which operates when the current flowing into FBT (T5R1) has increased. Once the X-ray protector and the over current protector have started operation, their operation is not canceled unless the power supply is switched off, and then on again.

*X-ray protector

When the high voltage rises, the voltage of T5R1 (FBT) pin 10 rises. This voltage is compared with the reference voltage in IC2001, and when the reference voltage is exceeded, the comparator operates and output voltage of IC2001 (5pin) is high level, then the operation of the high voltage control circuit is stopped.

*Overcurrent Protector

When the current flowing into T5R1 (FBT) pin 2 increases, Q5F1 operates and Q5F3 is switched on.
Also when the current flowing into T5R1 (FBT) pin 8 increases, Q5F2 operates and Q5F3 is switched on. When Q5F3 is switched on, Q5F4 is switched on and the voltage of ICD5P1 10pin rises.
Then latch circuit inside ICD5P1 operates and the high voltage control circuit is stopped.
While the protector circuit is operating, the voltage of ICD5P1 pin 3 is approx. 2V.

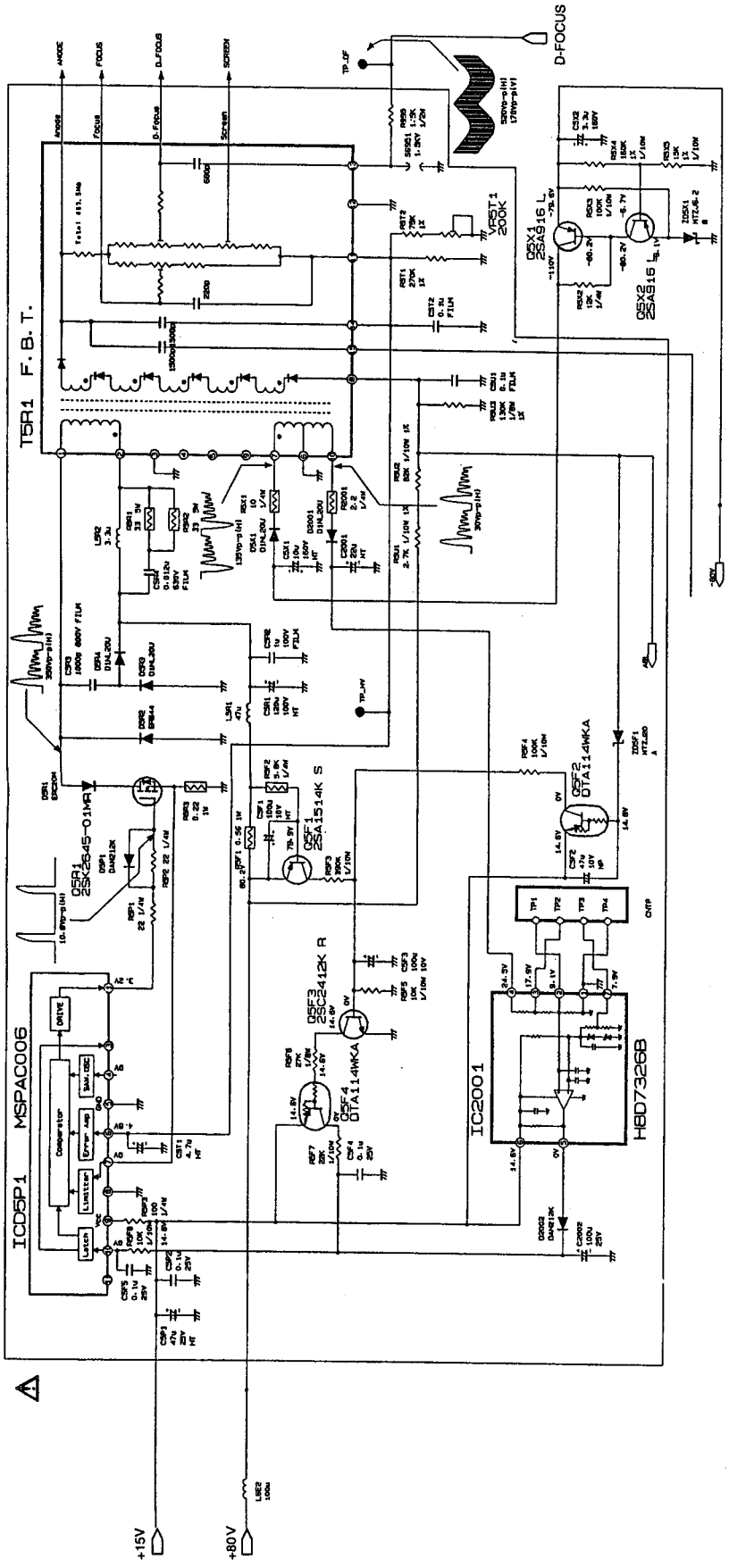


Fig.3.1 HIGH VOLTAGE CIRCUIT AND PROTECTOR CIRCUIT

4 .BLANKING CIRCUIT

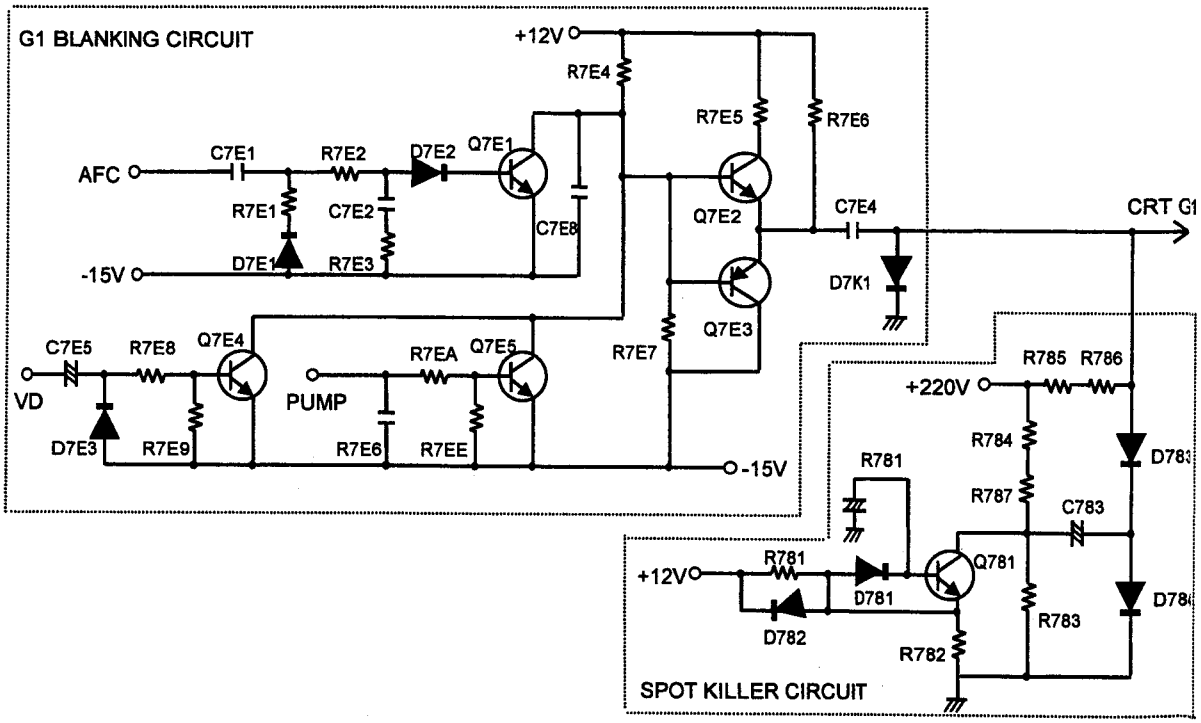
The blanking circuit consists of Q7E1 through Q7E5 which combine the horizontal and vertical blanking pulse, and the spot killer circuit.

1) Blanking Circuit

The horizontal blanking pulse is applied from the horizontal output transformer's AFC pulse. The vertical blanking pulses are generated by IC7A1 and pump-up pulse of vertical deflection circuit. The horizontal blanking pulse and the vertical blanking pulses are combined with Q7E1,Q7E4 and Q7E5, via Q7E2 and Q7E3, and are applied to G1. Therefore during the horizontal and vertical retrace periods, the voltage of G1 becomes low and then the raster is disappeared.

2) Spot Killer Circuit

The spot killer circuit operates when the display turned off, the suspend and the off modes. When the power is on, Q781 is turned off by 12VDC of C781 and the voltage of C783 is 137V. When the display is turn off, the Q781 is activated by the voltage of 12V power supply drop. Then the voltage of C783 becomes from 137V to12V, G! voltage becomes from 0V to -125V. It is the same with the suspend and the off modes. The raster is cut off.



(Fig 4.1) Blanking Circuit

5. Dynamic Focus Circuit

The dynamic focus section is made up of following three blocks:
The dynamic focus (D-FOCUS) IC (IC951) has the function of generating the horizontal/vertical parabolic wave as well as that of controlling the gain, the output amplifier, and the coupling circuit.

1) Horizontal Parabolic Wave Generation and Gain Control Circuit

The AFC pulse which is generated by the FBP(fly back pulse) of the secondary winding of the horizontal output transformer(T561) is shaped and input to IC951 17pin(AFC_TTL).
This pulse is used as a trigger and a sawtooth wave is generated at the sawtooth oscillator section in IC951. The sawtooth wave is converted to a parabolic wave at the X`2 circuit and the parabolic wave gain is adjusted with the pin 6 input voltage(H_DF). To set the peak voltage of this parabolic to an optimum amplitude with respect to the horizontal frequency and horizontal size, tracking is taken at the pin 19 input voltage(SUB_H_DF), i.e., the horizontal dynamic focus voltage.
The final horizontal parabolic wave is output from pin7.

2) Vertical Parabolic Wave Generation and Gain Control Circuit

The vertical sawtooth wave produced by the oscillator IC (IC501) is input to IC951 pin 2 (DF_SAW) and is converted to a parabolic wave in the X`2 circuit in IC951.
The gain of this parabolic wave is controlled by the pin 5 input voltage(V_DF), i.e.,the vertical dynamic focus voltage. The result is output to pin 4.

3) Output Amplifier Circuit and Coupling Circuit

The horizontal and vertical parabola waveforms are generated at IC951 and are clamped before each output circuit for wide dynamic range of the output circuit. The clamp voltage is determined by the voltages of ZD951 and ZD981.
After the clamp circuit, the horizontal parabola waveform is amplified by Q981. The output waveform at Q981 is input to T981 via the buffer circuit which is comprised of Q982, Q983, Q984 and Q985.
The gain of T981 is approximately 8. The vertical parabola waveform is amplified by Q987.
The output waveform at Q987 modulates the secondary winding of T981 as the vertical parabola waveform. Therefore, T981 outputs the horizontal parabola waveform which is modulated by the vertical waveform. This modulated waveform is input to the CRT focus grid via the built-in capacitor of T5R1(FBT).

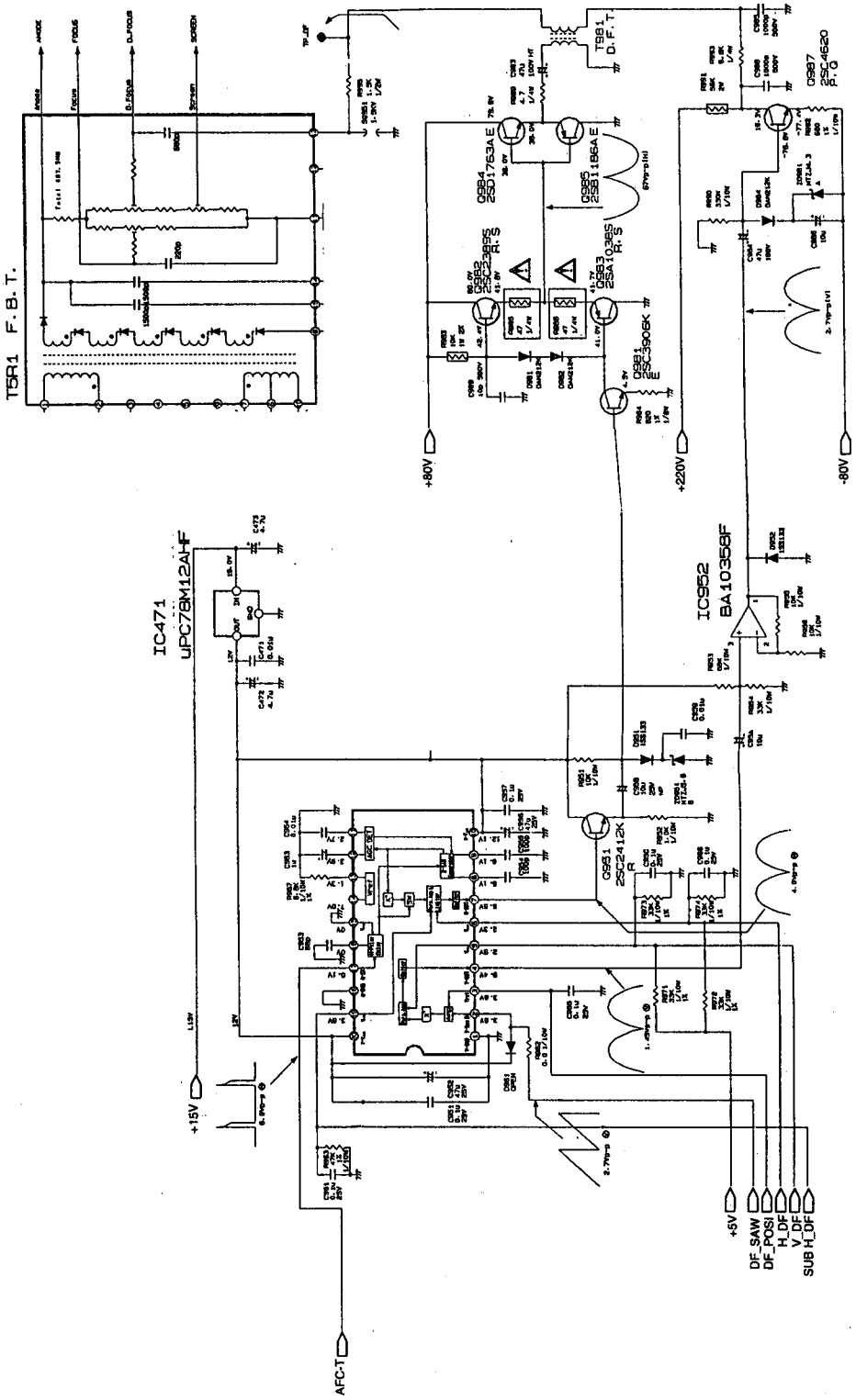


Fig. 5.1 DYNAMIC FOCUS CIRCUIT

6. CPU CIRCUIT

1) CPU

IC801 : 8 bit CPU / CMOS IC
IC802 : EEPROM / CMOS IC
IC571 : I/O Expander

This system has the following functions.
Frequency Counter
fH band
Degaussing Control
DAC control (see 2. DC Control Circuit)
PMS control (see 3. Power Management system (PMS) Circuit)
OSD control (see 5. User Control Operation)

a. Frequency Counter

IC801 counts Horizontal frequency by event counter, Vertical frequency by interval timer. Horizontal sync is negative input to IC801 pin 12. Vertical sync is positive input to IC801 pin 44.

Sync range

Horizontal	31.0 - 110.0 kHz
Vertical	55.0 - 160 Hz

If Horizontal frequency is less than 1 kHz or Vertical frequency is less than 10 Hz, IC801 judges "NO PULSE". And IC801 enters to "PMS MODE".

b. Fh Band

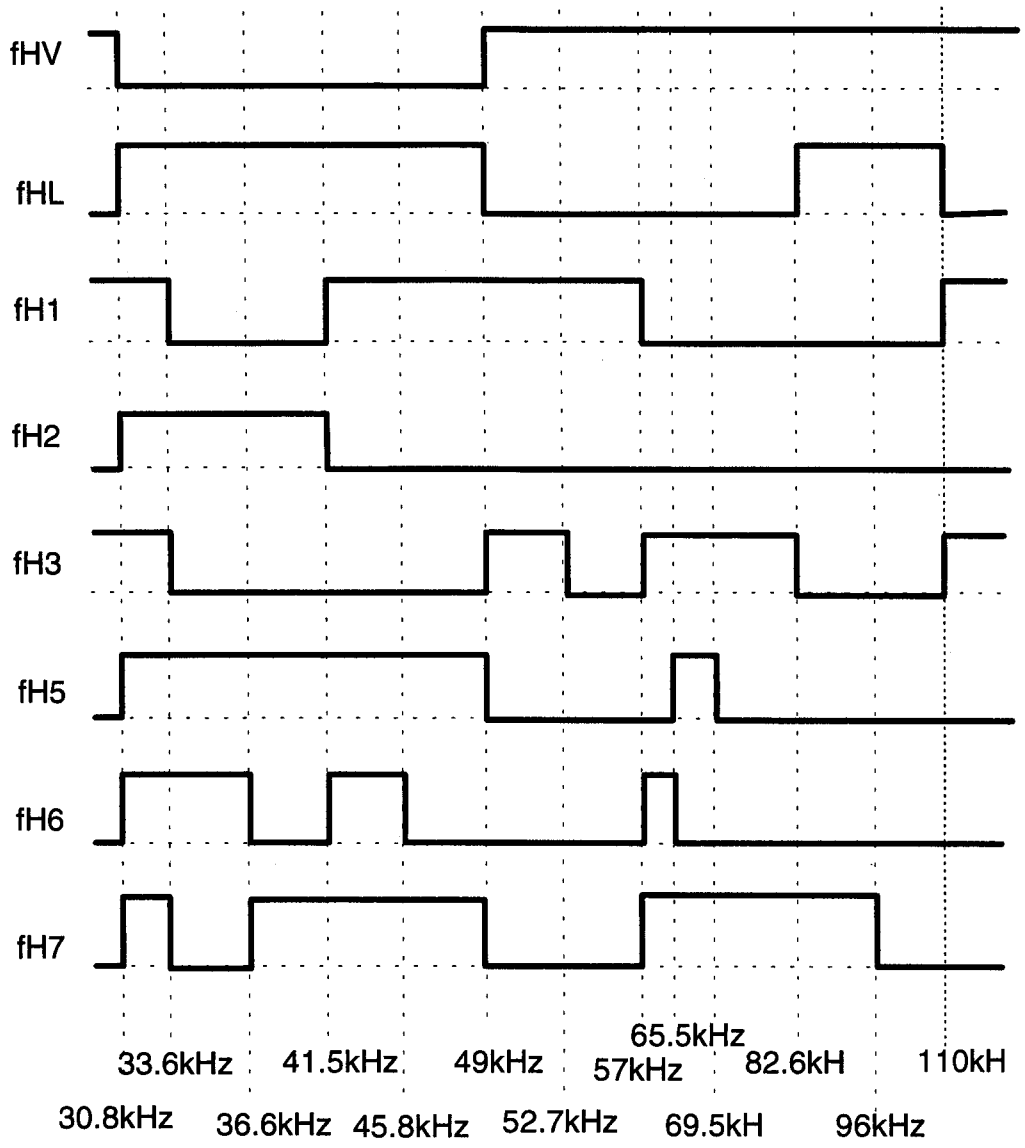


Fig. 6.1 Output fh Band status (IC571)

Attention : fH1 to 7 Band signals are output for horizontal output circuit control to keep the horizontal linearity constant. fHV and fHL signal is output for horizontal output circuit control to keep the horizontal linearity constant.

c. Degaussing Control

Manual degaussing signal. IC801 pin 61 becomes High for 3 seconds when user presses the "PROCEED" switch while "DEGAUSS" (MENU(u) - "BRIGHTNESS & CONTRAST") or "GLOBALSYNC" (MENU(u) - "TOOL2") is highlighted, the monitor is powered on.

DAC - "H-CONV", "V-CONV", "TILT", and "EMF" data value is set to center, while degaussing. This pin will be LOW in normal condition.

2) DC Control Circuit

CPU (IC801) controls five DAC ICs (IC531, IC532, IC4M1, IC751, IC711) through I^2C BUS. Its analog outputs control DAC output so that the analog voltage corresponds to the DC control data from CPU. IC802 is an EEPROM which stores the DC control data for preset graphics standard timings.

Table 1 Summary of DAC control (IC531 on DEF PWB: CS0=CS1=CS2=0)

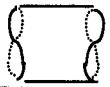
PORT	NAME	Summary
A01	H_SIZE	Horizontal size adjustment
A02	HSMAX	Horizontal maximum size adjustment
A03	S_DIST	Side distortion adjustment 
A04	MOIRE	Moire Canceller level adjustment
A05	-	Not in use
A06	SUB_HDF	Horizontal Dynamic Focus adjustment (sub)
A07	VDF	Vertical Dynamic Focus adjustment
A08	HDF	Horizontal Dynamic Focus adjustment

Table 2 Summary of DAC control (IC532 on DEF PWB: CS0=1 CS1=CS2=0)

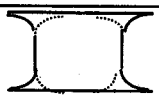
PORT	NAME	Summary
A01	VLC	Vertical linearity balance adjustment (top - bottom)
A02	VLS	Vertical linearity balance adjustment (center - top/bottom)
A03	H_HOLD	Horizontal free-run frequency adjustment
A04	H_F/V	Horizontal frequency versus voltage adjustment
A05	H_POSI	Horizontal position adjustment
A06	V_SIZE	Vertical size adjustment
A07	VPOSI	Vertical position adjustment
A08	CORNER	Corner distortion adjustment 
A09	TRP	Trapezoid adjustment
A10	PAR	Parallelogram adjustment
A11	SDPB	Side Pin Balance adjustment
A12	SDP	Side Pin adjustment

Table 3 Summary of DAC control (IC4M1 on INLET PWB: CS0=0 CS1=1 CS2=0)

PORT	NAME	Summary
A01	H-CONV	Horizontal Static Convergence Adjustment
A02	V-CONV	Vertical Static Convergence Adjustment
A03	TILT	Display tilt (raster rotation) adjustment
A04	EMF	Earth Magnetic Field Correction
A05	-	Not in use
A06	-	Not in use
A07	-	Not in use
A08	-	Not in use

Table 4 Summary of DAC control (IC751 on VIDEO PWB: CS0=1 CS1=1 CS2=0)

PORT	NAME	Summary
A01	B_BIAS	CRT Cut off adjustment (Blue)
A02	B_BRT	Brightness tracking adjustment (Blue)
A03	G_BIAS	CRT Cut off adjustment (Green)
A04	G_BRT	Brightness tracking adjustment (Green)
A05	-	Not in use
A06	SUB_BIAS	CRT Cut off adjustment
A07	R_BRT	Brightness tracking adjustment (Red)
A08	R_BIAS	CRT Cut off adjustment (Red)

Table 5 Summary of DAC control (IC711 on VIDEO PWB)

PORT	NAME	Summary
D/A OUT1	SHARP1	Picture sharpness control 1
D/A OUT2	SHARP2	Picture sharpness control 2
D/A OUT3	CLP_PHASE	Video clamp position control
D/A OUT4	GAIN_ADJ	Video gain adjutment

3) Power Management System (PMS) Circuit

PMS circuits reduce power consumption. They have 3 modes of stand-by, suspend and off.

Table 8 PMS Mode (IC801)

Mode	Pin 60 PMS_SUS#	Pin 62 PMS_OFF	Pin 59 POWER LED
On	High	Low	High
Stand-by	High	Low	High
Suspend	Low	Low	Pulse(1KHz)
Off	Low	High	Low

a. Stand-by Mode

When the horizontal sync is not input, this monitor enters stand-by mode in a few seconds. IC801 controls IC791(OSD IC). Then video signal of IC711 pin 29, 32, 34 are stopped by blanking pulse IC791 pin 12. When the horizontal sync is input, this monitor returns to normal operation mode with the shortest recovery time.

b. Suspend Mode

When the vertical sync is not input, this monitor enters suspend mode in a few seconds. IC801 outputs pulse(1kHz) from pin 59. Because Q101 and Q102 toggle on-off alternately, LED101 turns yellow. IC801 pin 60 outputs low to operate each power saving circuit. When the vertical sync is input to this monitor, it becomes normal operation mode with longer recovery time than stand-by Mode.

c. OFF mode

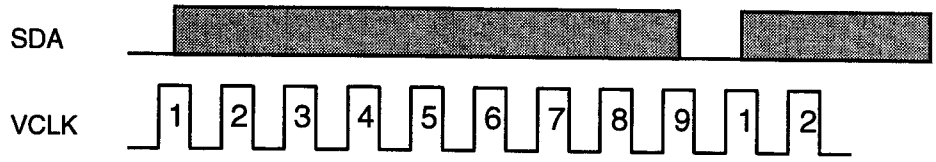
When the horizontal sync and vertical sync are not input, this monitor enters off mode in a few seconds. IC801 pin 62 becomes high, then IC8G1 (5V regulator) turns off.

4) Plug and Play (DDC 1 / 2)

VESA Display Data Channels (DDC)

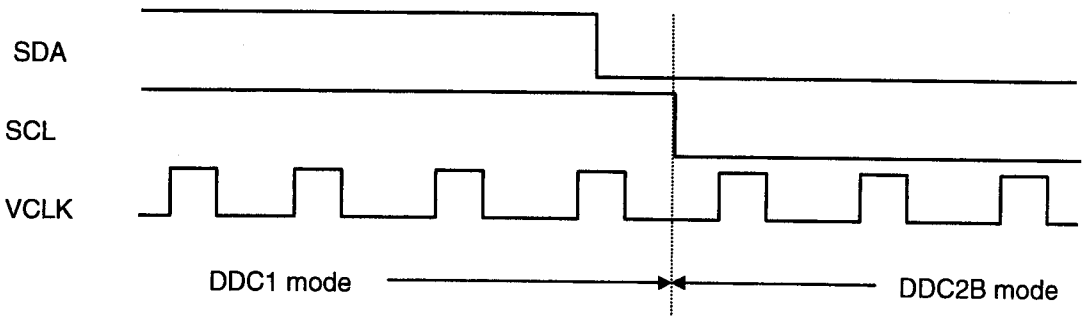
a. DDC1

When the monitor is turned on, the operation mode starts in DDC1 mode. When the VCLK (SYNC) is provided to IC8A1 pin 7, serial data stream is generated from the IC8A1 pin 5 by synchronizing with the rising edge of the VCLK. The contents of the serial data (SDA) is called EDID, and it contains the information of monitor's specification and supported signals. The EDID is composed of 8 bits, 128 bytes, but the individual data is composed of 9 bits. The 9th bit is always low and is ignored. If 128 bytes are finished to generate, then the 24LCS21A starts to generate the first byte. This operation lasts continuously until the operation mode changes to DDC2B.



b. DDC2B

When the SCL (IC8A1 pin 6) input is changed from high to low, the operation mode changes from DDC1 to DDC2B. The output data is the same as DDC1 (EDID), but the communication protocol is different. In DDC2B mode, the serial data is communicated by I^2C-bus protocol. The operation mode never go back from DDC2B to DDC1 except by turning off the monitor.



5) User Control Operation

User Control Interface (IC801)

Table 9 Input (IC801)

Pushed SW	pin 42	pin 41	pin 40	pin 39	pin 38	pin 37	pin 36
EXIT	High	Low	Low	Low	Low	Low	Low
-	Low	High	Low	Low	Low	Low	Low
▼	Low	Low	High	Low	Low	Low	Low
▲	Low	Low	Low	High	Low	Low	Low
+	Low	Low	Low	Low	High	Low	Low
PROCEED	Low	Low	Low	Low	Low	High	Low
RESET	Low	Low	Low	Low	Low	Low	High

① OSD

This model is adjusted through OSD (On Screen Display; it is called OSM™ in the USA), by operating Control Panel. It is located on the lower left corner of front panel.

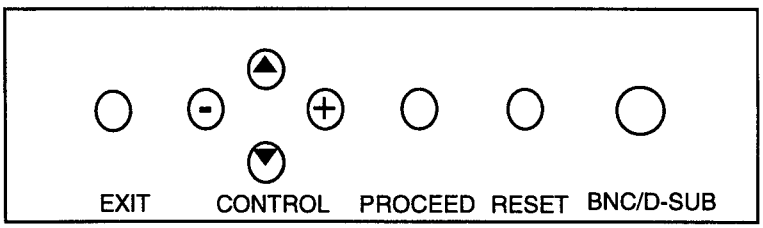


Fig. 6.2 Control Panel

② OSM MENU structure is as below. (It is structured "TAB", "SUB MENU")

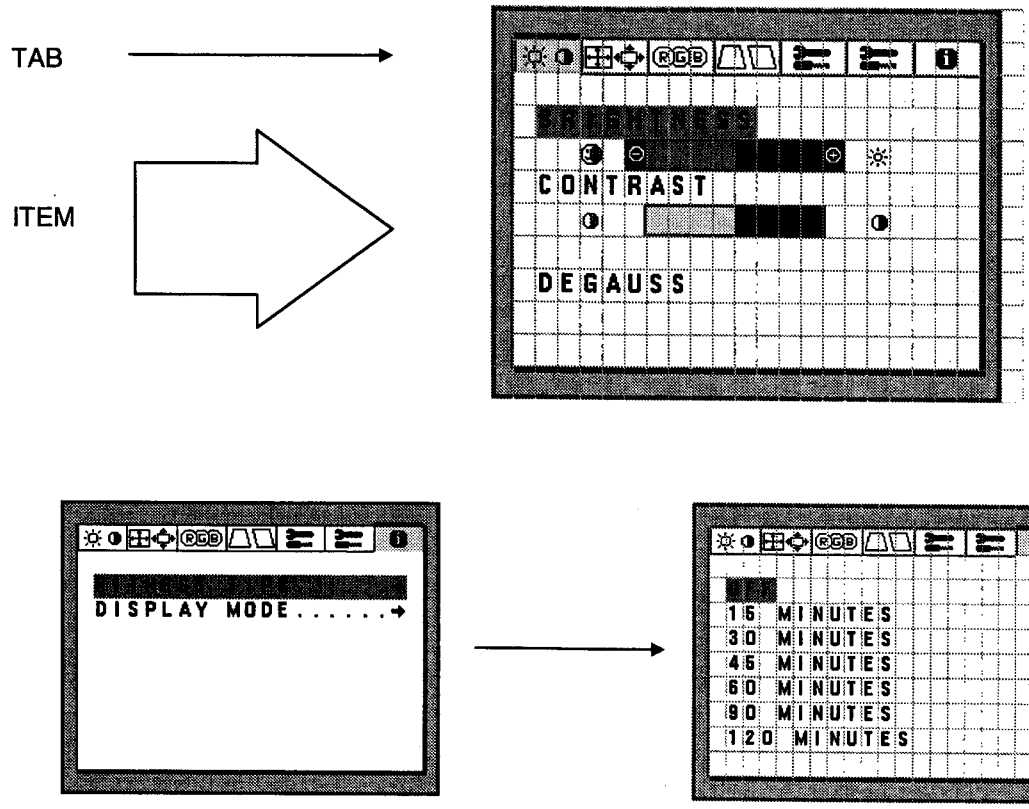


Fig. 6.3 SUB MENU

Table 10 USER CONTROL SWITCH FUNCTION

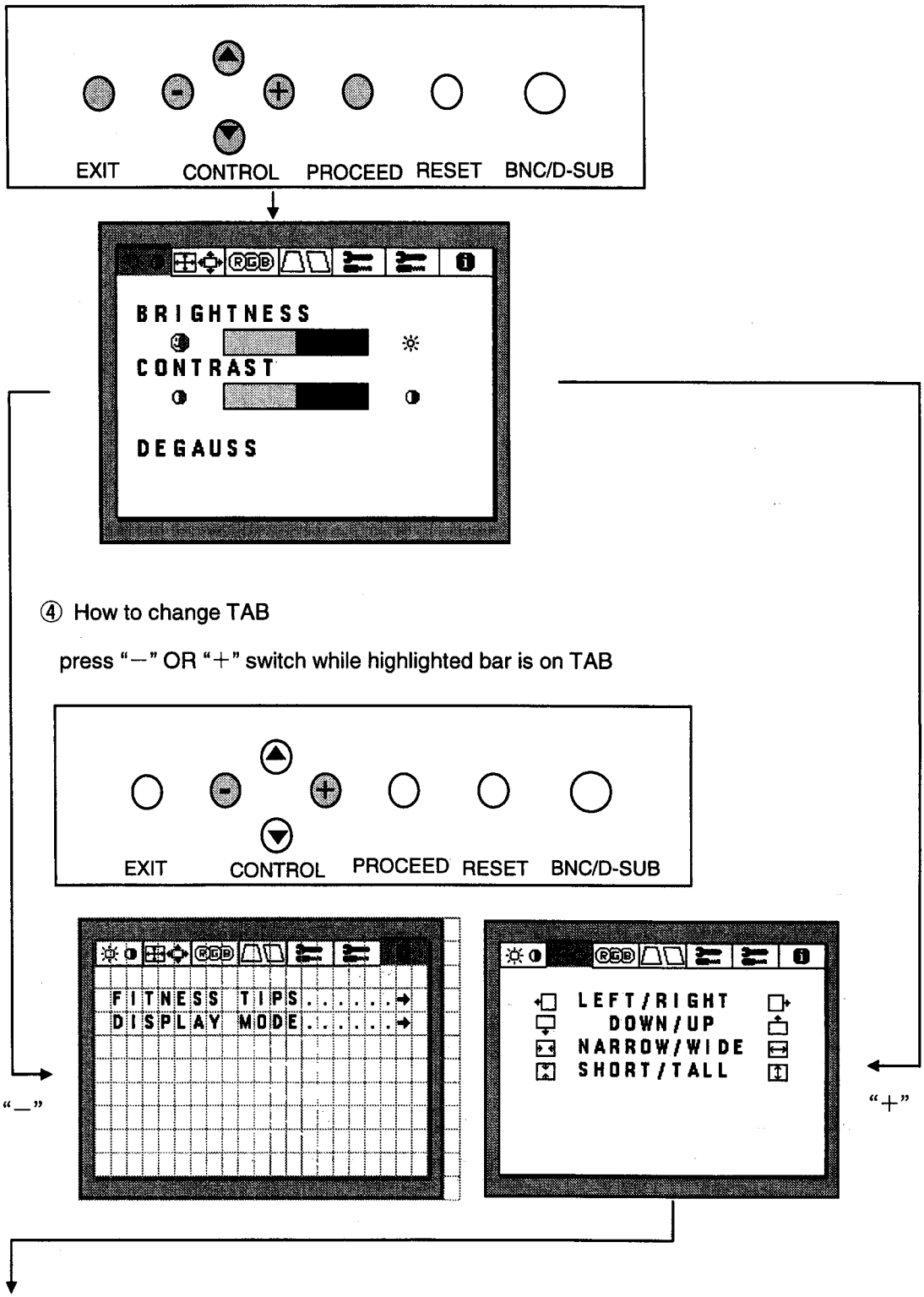
MENU \ KEY		"EXIT"	"−"	"+"	"▲"	"▼"	"PROCEED"
TAB	TAB		○	○			
TAB	ITEM					○	
ITEM	SUBMENU						○
ITEM	ITEM				○	○	
SUBMENU	ITEM	○					
ITEM	TAB	○			○*	○**	
ALLITEM	TAB	○					

* : Valid only if highlighted bar is on top ITEM

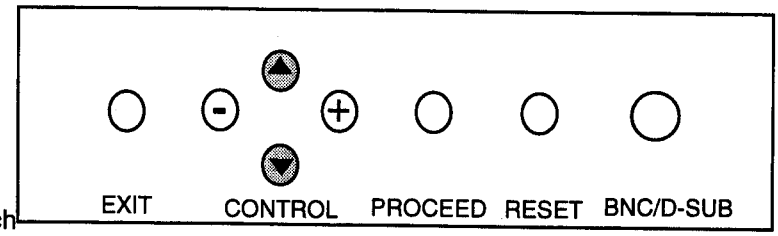
** : Valid only if highlighted bar is on bottom ITEM

③ How to display OSM MENU

MENU(u) : Press "EXIT" or "−", "+", "▲", "▼", "PROCEED" once when OSM MENU is not displayed.

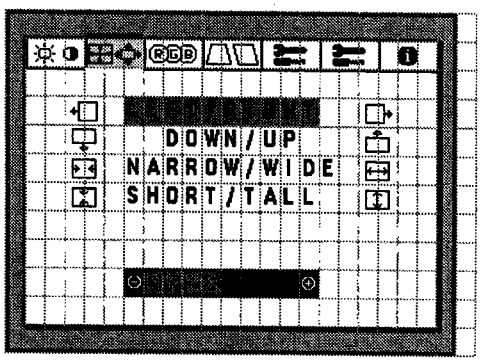


⑤ Select ITEM



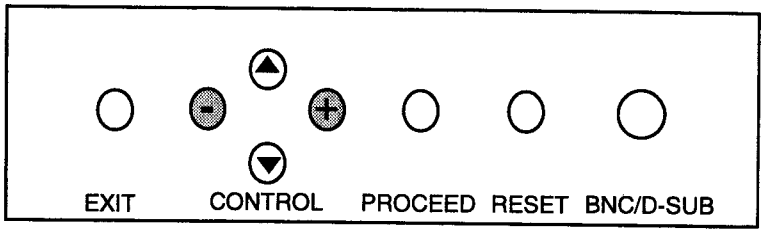
Press "▲" or "▼" switch

"▼"

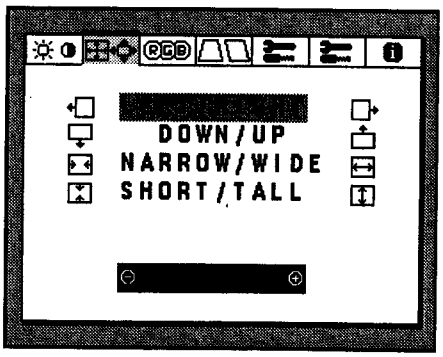


6) Change DATA Value

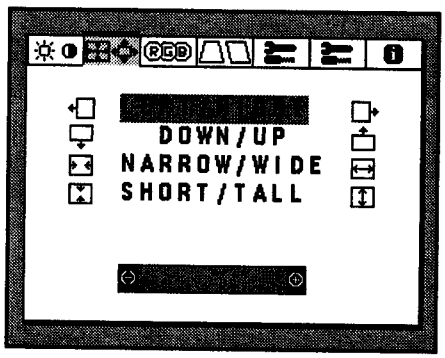
Press "−" or "+" switch while highlighted BAR is on ITEM



"−"

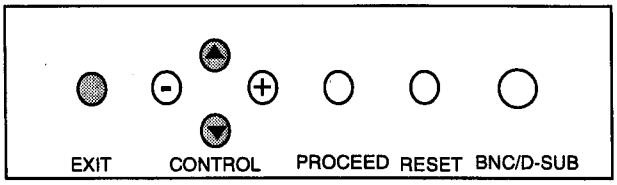


"+"



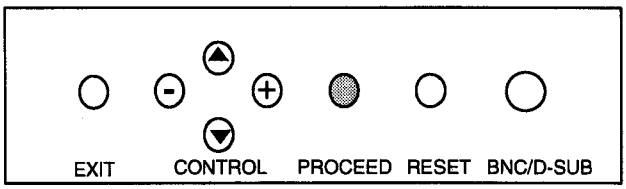
7) Save DATA Value To Memory

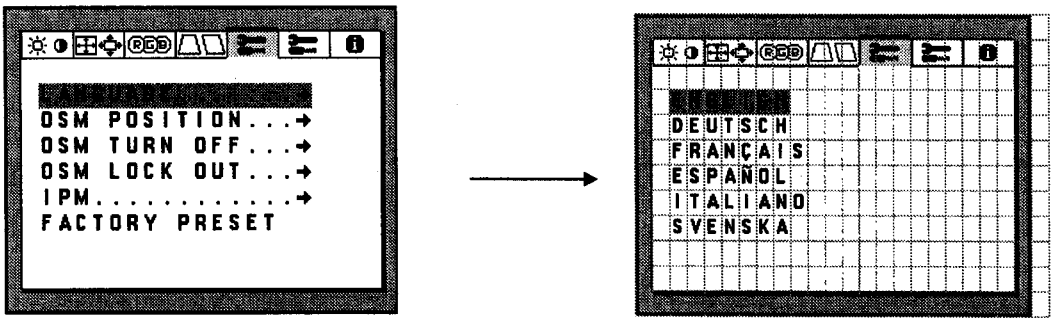
Move highlighted BAR to other "ITEM" or "TAB" (press "EXIT" or "▼", "▲")



8) Open SUB MENU

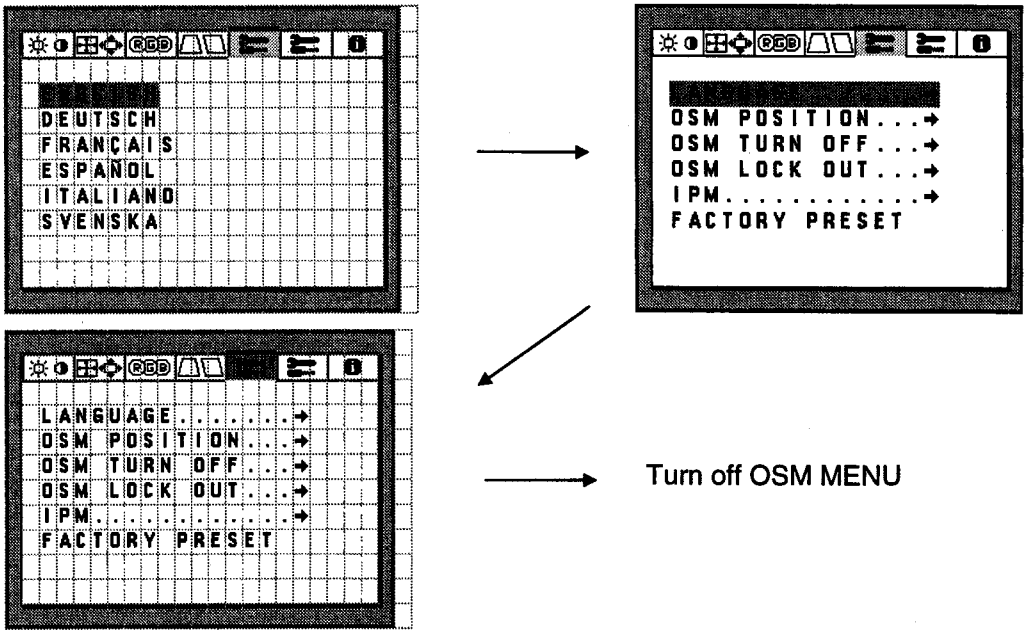
Press "PROCEED" switch when the highlighted "ITEM" contains "..→"





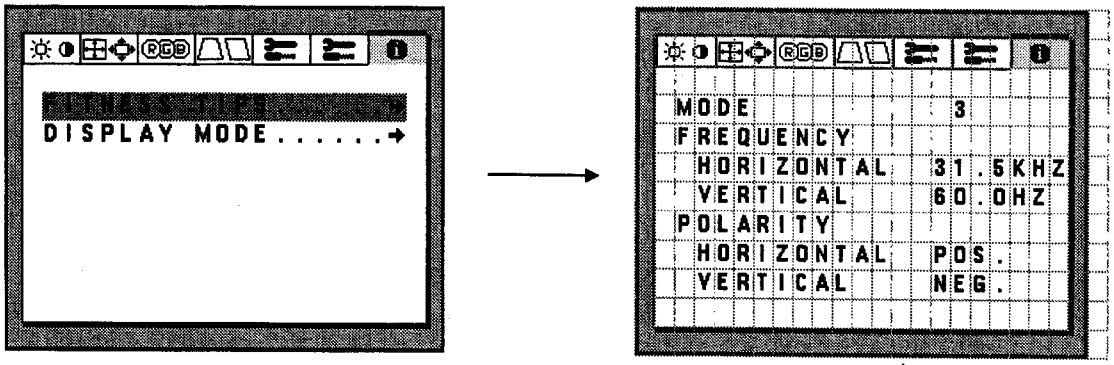
9) Turn off OSM MENU

Press "EXIT" switch once : when highlighted BAR is on "TAB"
twice : when highlighted BAR is on "TAB"
three times : when entering "SUB MENU"

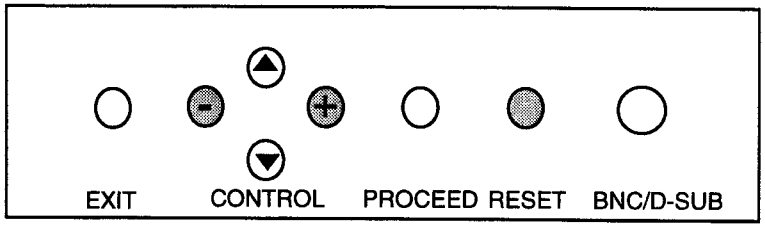


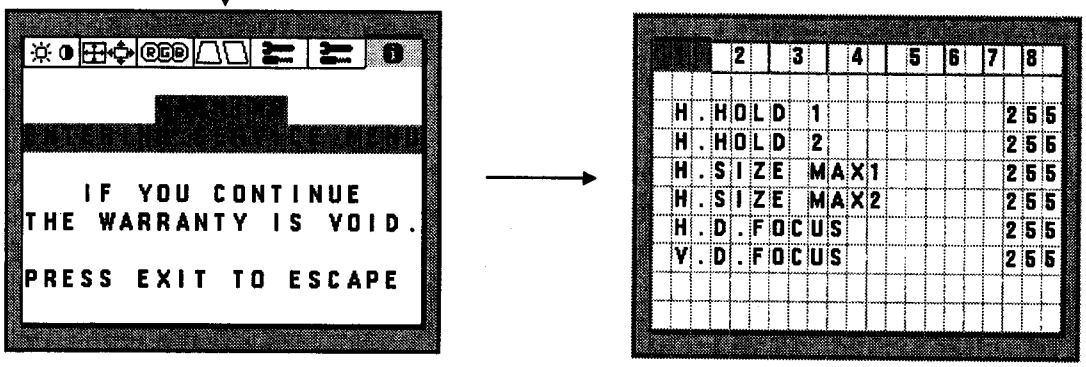
10) Open MENU(s)

Open menu "INFORMATION" - "DISPLAY MODE"



then press "RESET" and "+", "−" switch at same time





A warning message will be displayed, then press "PROCEED"

· OSM MENU Structure

1. MENU(u)

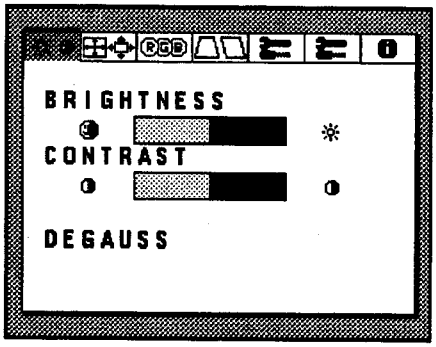


Fig. 6.4 MENU(u) - "BRIGHTNESS&CONTRAST"

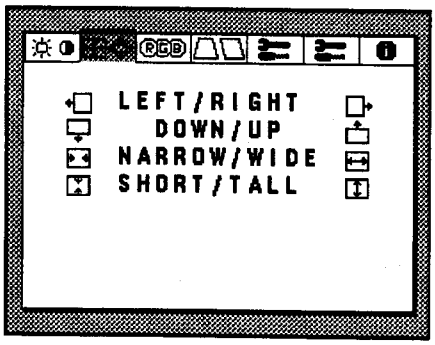


Fig. 6.5 MENU(u) - "SIZE & POSITION"

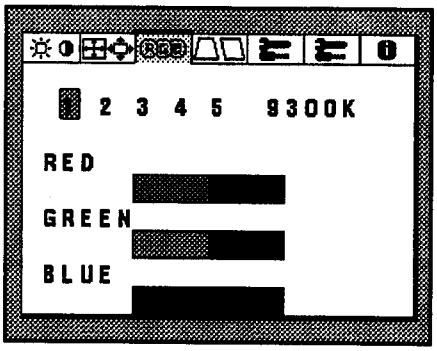


Fig. 6.6 MENU(u) - "RGB"

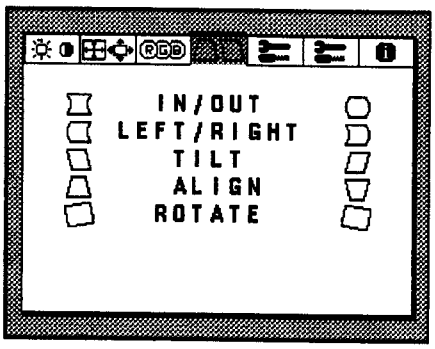


Fig. 6.7 MENU(u) "GEOMETRY"

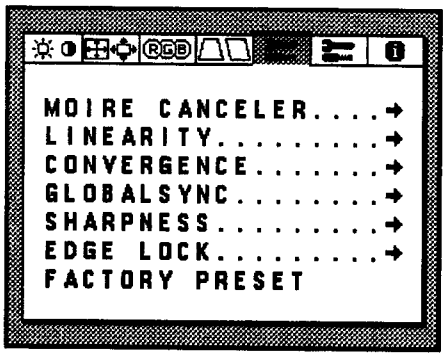


Fig. 6.8 MENU(u) - "TOOL1"

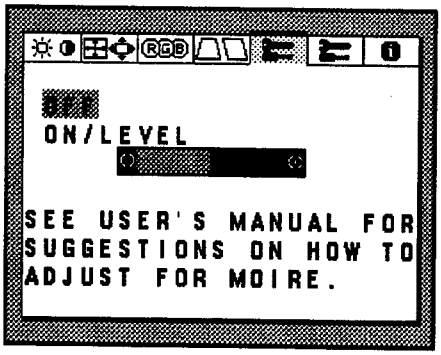


Fig. 6.9 SUB MENU(u) - "MOIRE CANCELER"

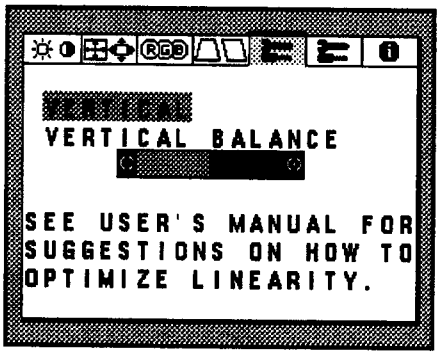


Fig. 6.10 SUB MENU(u) - "LINEARITY"

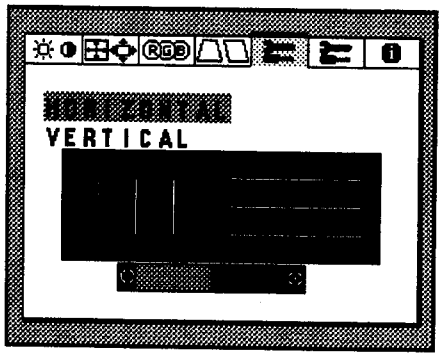


Fig. 6.11 SUB MENU(u) - "CONVERGENCE"

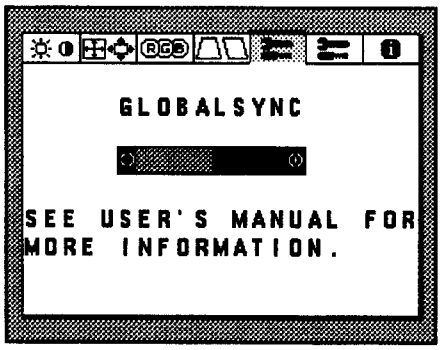


Fig. 6.12 SUB MENU(u) - "GLOBALSYNC"

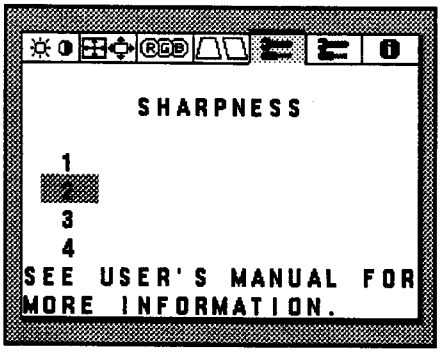


Fig. 6.13 SUB MENU(u) - "SHARPNESS"

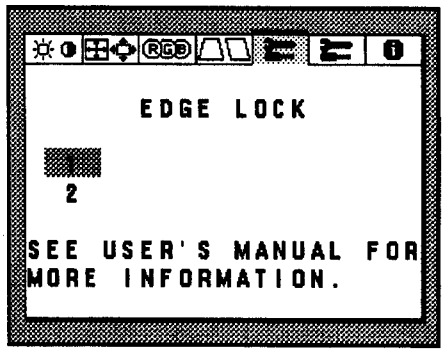


Fig. 6.14 SUB MENU(u) - "EDGE LOCK"

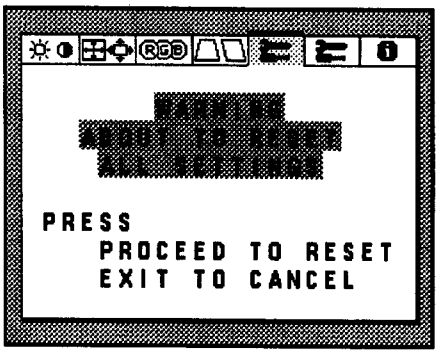


Fig. 6.15 SUB MENU(u) -"FACTORY PRESET"

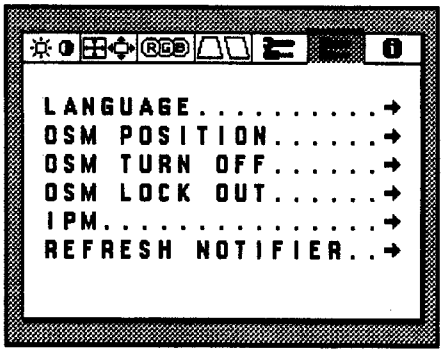


Fig. 6.16 MENU(u) - "TOOL2"

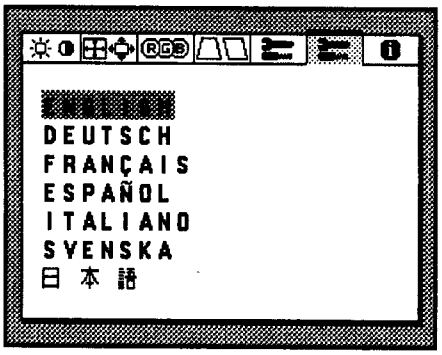


Fig. 6.17 SUB MENU(u) - "LANGUAGE"

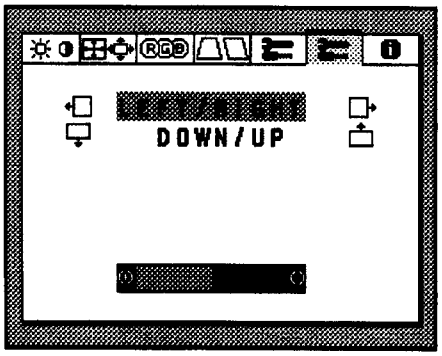


Fig. 6.18 SUB MENU(u) - "OSM POSITION"

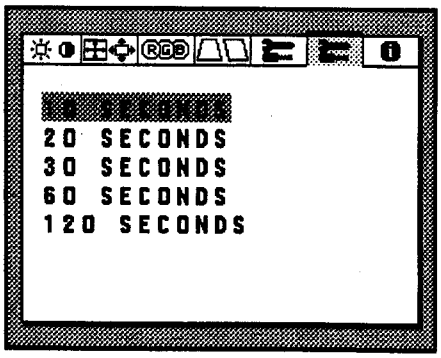


Fig. 6.19 SUB MENU(u) - "OSM TURN OFF"

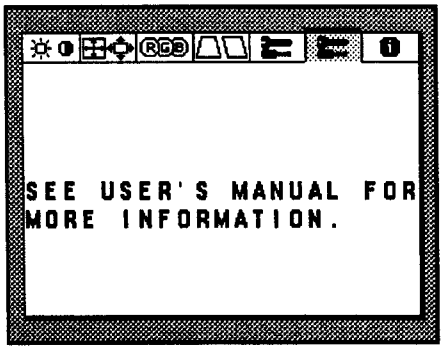


Fig. 6.20 SUB MENU(u) - "OSM LOCK OUT"

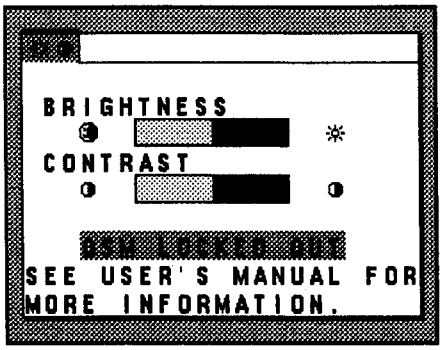


Fig. 6.21 "OSM LOCK OUT" MESSAGE

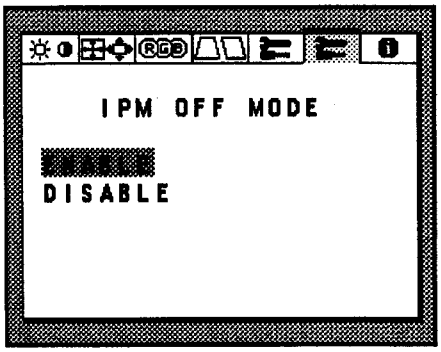


Fig. 6.22 SUB MENU(u) - "IPM"

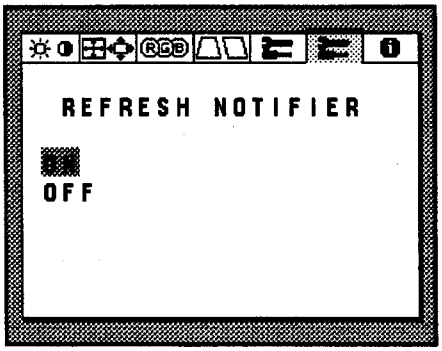


Fig. 6.23 SUB MENU(u) - "REFRESH NOTIFIRE"

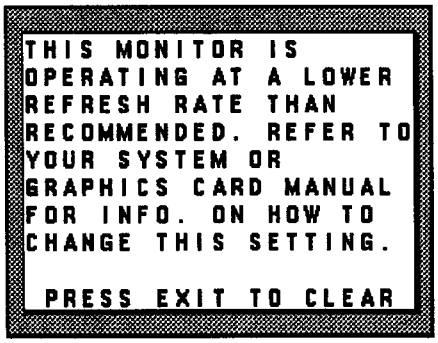


Fig. 6.24 "REFRESH NOTIFIRE" MESSAGE

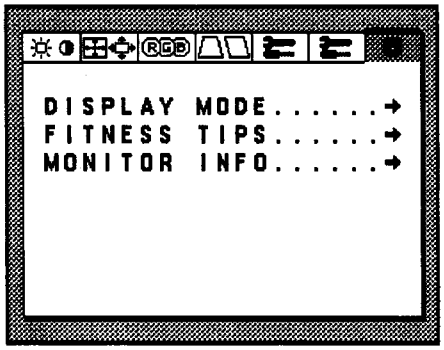


Fig. 6.25 MENU(u) - "INFORMATION"

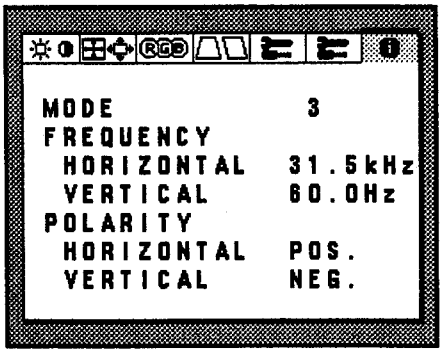


Fig. 6.26 SUB MENU(u) - "DISPLAY MODE"

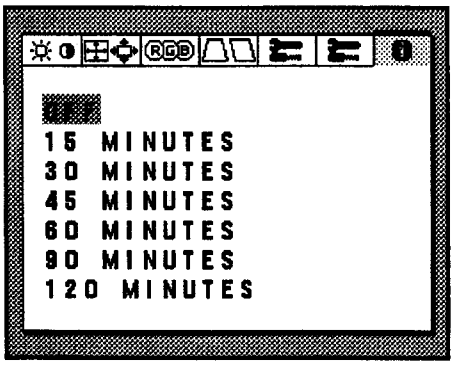


Fig. 6.27 SUB MENU(u) - "FITNESS TIPS"

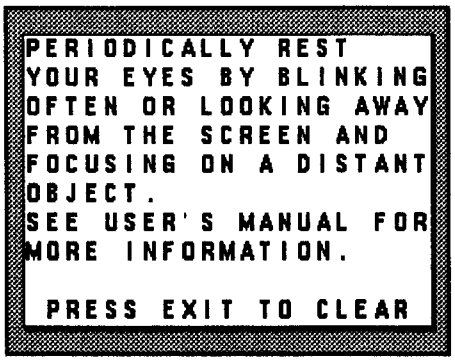


Fig. 6.28 "FITNESS TIPS" MESSAGE-1

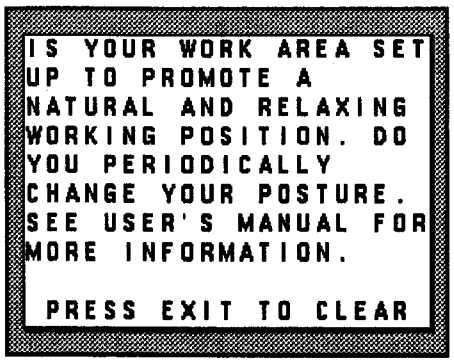


Fig. 6.29 "FITNESS TIPS" MESSAGE-2

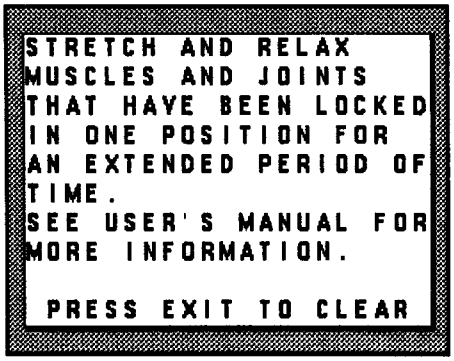


Fig. 6.30 "FITNESS TIPS" MESSAGE-3

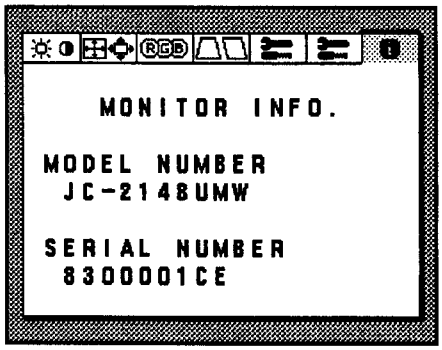


Fig. 6.31 SUB MENU(u) - "IPM"

2. MENU(s)

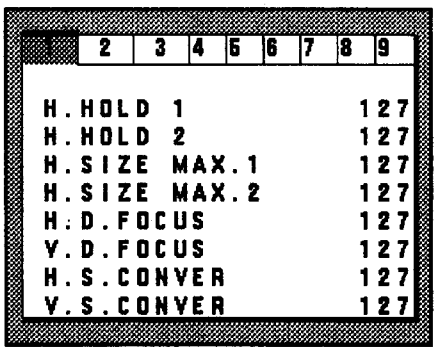


Fig. 6.32 MENU(s) - TAB1

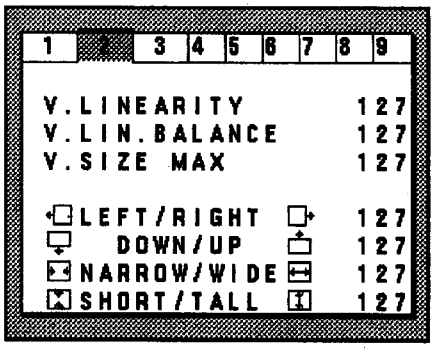


Fig. 6.33 MENU(s) - TAB2

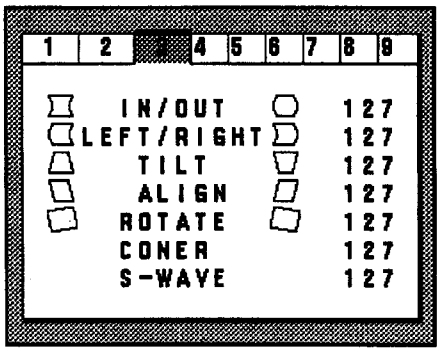


Fig. 6.34 MENU(s) - TAB3

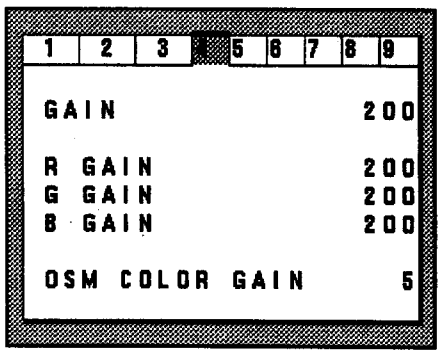


Fig. 6.35 MENU(s) - TAB4

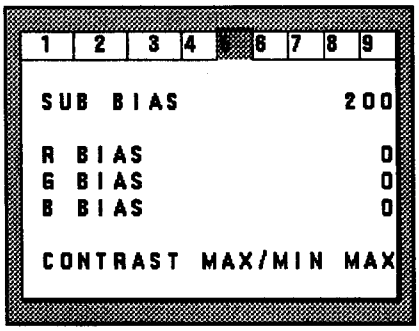


Fig. 6.36 MENU(s) - TAB5

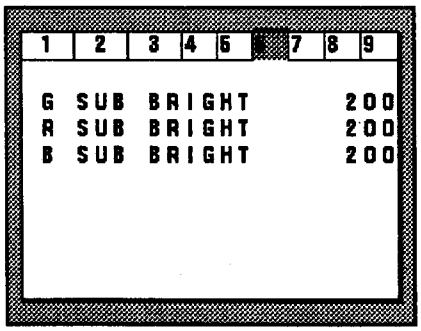


Fig. 6.37 MENU(s) - TAB6

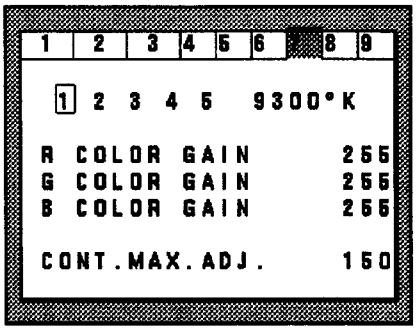


Fig. 6.38 MENU(s) - TAB7

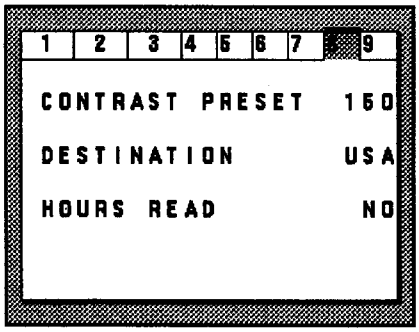


Fig. 6.39 MENU(s) - TAB8

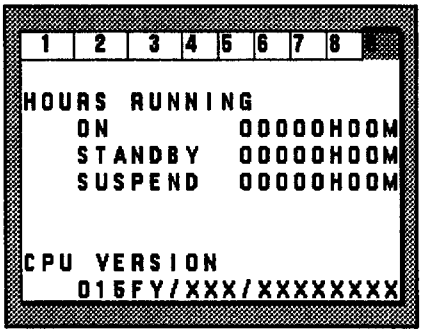
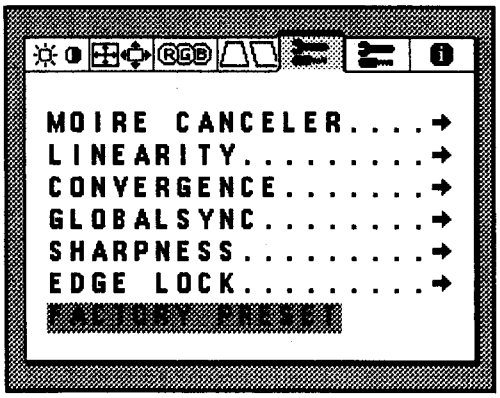


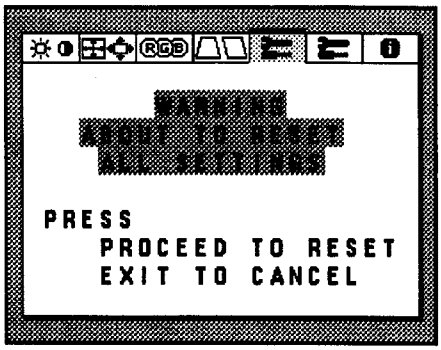
Fig. 6.40 MENU(s) - TAB9

Factory Preset

Open Menu(u) - "TOOL1", then move highlighted BAR to "FACTORY PRESET"



"Warning message" will be displayed, when "RESET" switch is pressed.



All user setting are set to "FACTORY PRESET" value when "PROCEED" switch is pressed.

Table 11 FACTORY PRESET

TAB	ITEM	preset value
BRIGHTNESS & CONTRAST	BRIGHTNESS	SET TO FACTORY PRESET
	CONTRAST	A/R/Asver.:MAXIMUM Bver.:90cd
	DEGAUSS	---
SIZE & POSITION	ALL ITEMS	SET TO FACTORY PRESET
RGB	12345	NO. 1 (9300K)
	RED, GREEN, BLUE	SET TO FACTORY PRESET
GEOMETRY	ALL ITEMS	SET TO FACTORY PRESET
TOOL1	MOIRE CANCELER	MODE : OFF LEVEL : MINIMUM
	LINEARITY	SET TO FACTORY PRESET
	CONVERGENCE	SET TO FACTORY PRESET
	GLOBALSYNC	VARIABLE CENTER POSITION
	SHARPNESS	MODE 2
	EDGE LOCK	NO CHANGE
TOOL2	LANGUAGE	NO CHANGE
	OSM POSITION	SET TO FACTORY PRESET
	OSM TURN OFF	30 SECONDS
	OSM LOCK OUT	---
	IPM	NO CHANGE
	REFRESH NOTIFIER	MODE:OFF
INFORMATION	FITNESS TIPS	OFF

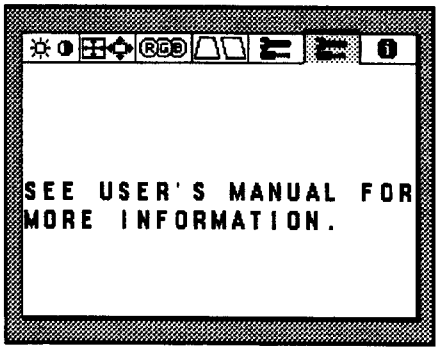
FITNESS TIPS

How to confirm "FITNESS TIPS" message.

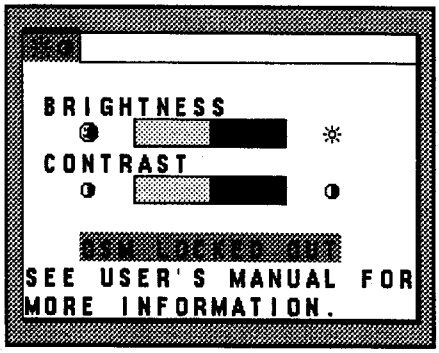
1) Open SUB MENU(u) - "INFORMATION" - "FITNESS TIPS"
2) Press "+" and "−" switch together, then message will be displayed.
3) Press "+" switch, then message will change.
4) Press "+" switch, then message will change.
5) Press "+" switch, the SUB MENU(u) - "INFORMATION" - "FITNESS TIPS" will be displayed.

OSM LOCK OUT

1) Open MENU(u) - "TOOL1"
2) Move highlighted BAR to "OSM LOCK OUT"
3) Press "PROCEED" switch while "OSM LOCK OUT" is highlighted, then message will be displayed as below.



4) Press "▲" and "PROCEED" switch together, then message will be displayed as below, and OSM is locked out.



5) Any control switch does not work while OSM is locked out.

6) To unlock "OSM LOCK OUT", press "▲" and "PROCEED" switch together when the above message is displayed.

7. MOIRE CANCELLER

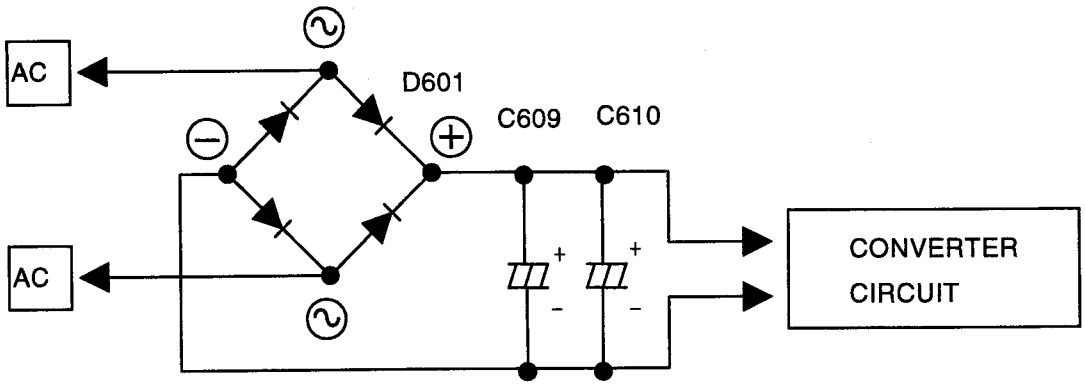
The horizontal timing pulses are outputted from IC541 pin 5, 6 on the DEF PWB. Their frequencies are the same, and they are half of the horizontal frequency. But the output levels are opposite.
Also the vertical timing pulses are outputted from IC541 pin 5, 6. Their frequencies are the same, and they are half of the vertical frequency. But the output levels are opposite.
The horizontal timing pulses and the vertical timing pulses are composited by Q543, Q544, D541 and D542. The composite timing pulse has half of the horizontal frequency, and the output level is inverted with each vertical sync.
This composite timing pulse is added to the level shift circuit (R547, R548, R549) through Q545. The output voltage from the level shift circuit is controlled by DAC output voltage from IC531 pin 15. And its voltage is added to C545 through the current amplifier (Q546)

8. SWITCHING REGULATOR CIRCUIT

1) Rectifying and Smoothing Circuit

AC input is rectified by D601. Then, it is smoothed by C609 and C610.

The resulting DC voltage is supplied to the converter circuit.



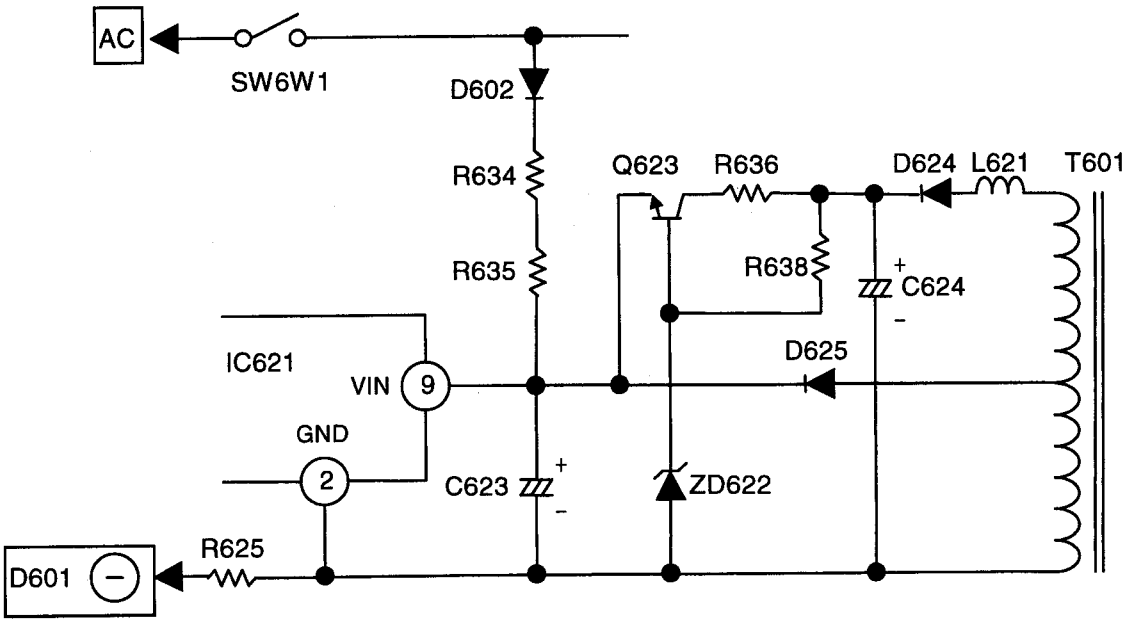
(Fig. 8-1) Rectifying and Smoothing Circuit

2) Auxiliary Power Supply Circuit

The auxiliary power supply circuit need to activate IC621. When the power switch is turn on, the current flows into the capacitor C623 through R634, R635 and D602. Oscillation starts when the voltage of IC621 pin 9 reaches 8V by this action.

After the start of oscillation, the fly-back voltage of the auxiliary winding of T601 is rectified and smoothed by D625 and C623.

The resulting DC voltage is supplied to IC621 pin 9.

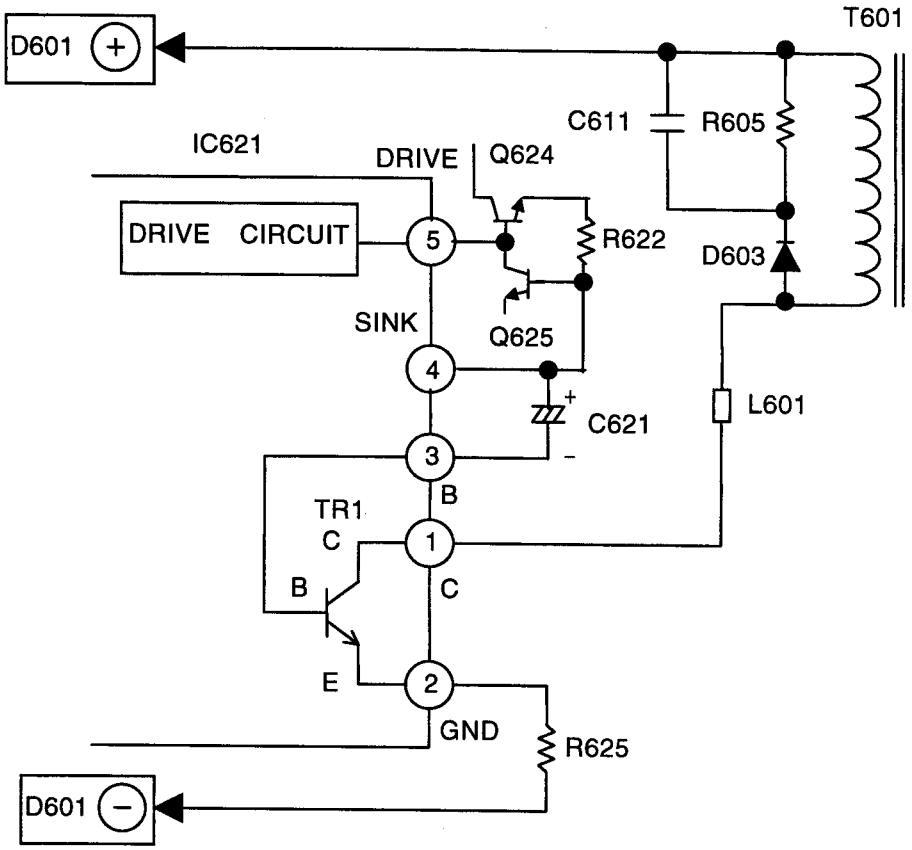


(Fig.8-2) Auxiliary Power Supply Circuit

3) Converter Circuit

The converter circuit consists of the primary winding of T601, a switching device TR1(internal IC621) and surge absorbers (C611, R605 and D603) which are connected to the primary winding of T601.

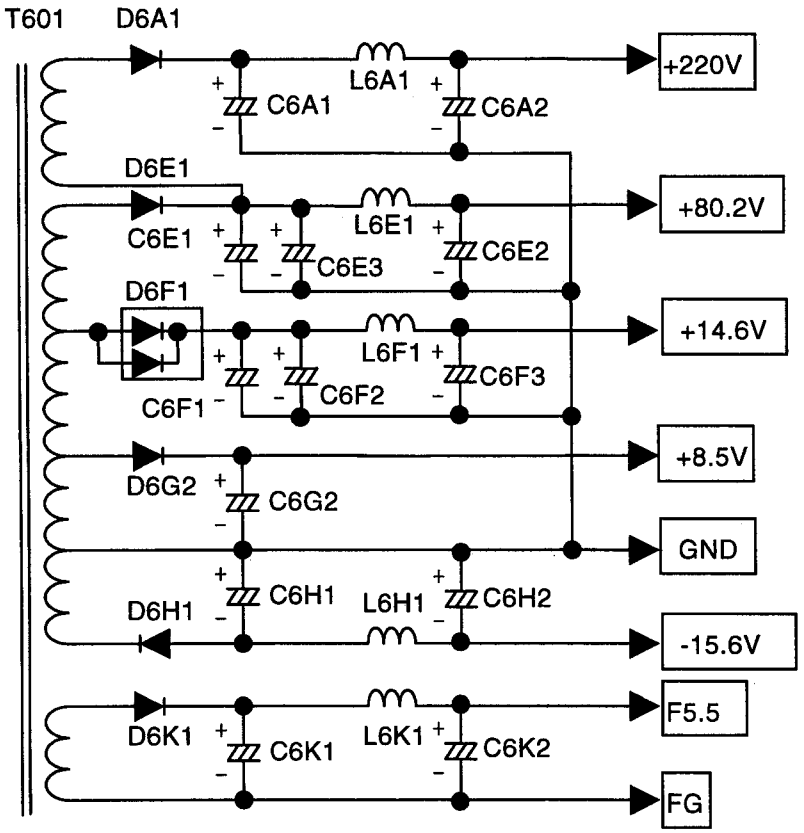
The oscillating signal through IC621 pin 5,Q624,R622 and C621 applied to IC621 pin 3(the base of TR1) so that the collector-emitter is turned ON and OFF. In result, the oscillating voltage is applied to the primary winding of T601.



(Fig.8-3) Converter Circuit

4) Output Rectifying and Smoothing Circuit

The fly-back voltages which are generated at the secondary windings of T601 are rectified by D6A1, D6E1, D6F1, D6G2, D6H1 and D6K1. Then, these voltages are smoothed by C6A1, C6A2, C6E1, C6E2, C6F1, C6F2, C6F3, C6G2, C6H1, C6H2, C6K1 and C6K2 so that DC voltages are obtained. The DC voltages are maintained constantly by controlling the ON period duty cycle of TR1 (internal IC621) in the converter circuit.

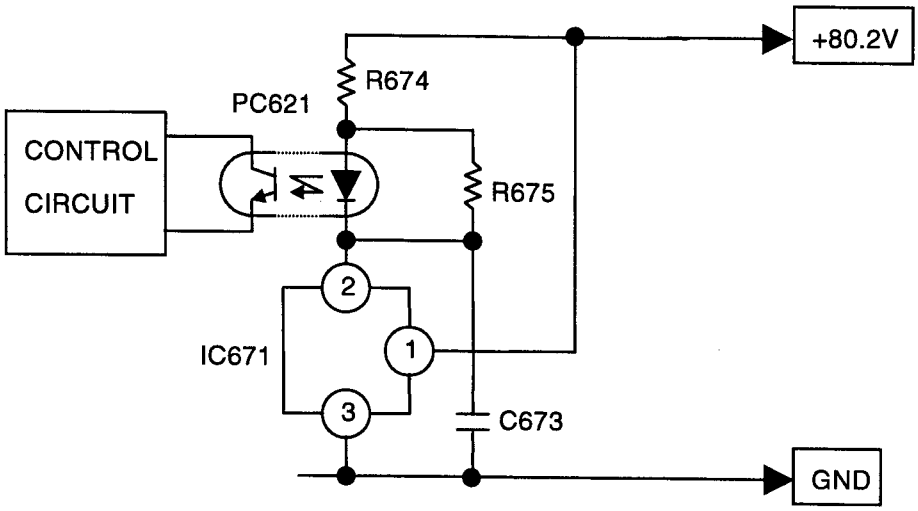


(Fig.8-4) Output Rectifying and smoothing Circuit

5) Error Detection Amplifier Circuit

The output voltage +80.2V is compared with the reference voltage at the error amplifier IC671.

An error signal is applied to the control circuit via the photocupler PC621.

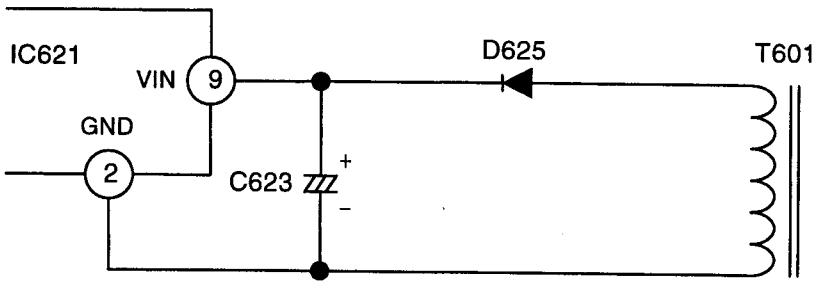


(Fig.8-5) Error Detection Amplifier Circuit

6) Over Voltage Protection

If some failure occurs and the output voltage of the secondary windings of T601 increase, the voltage of the auxiliary winding of T601 also increase proportionally. When the voltage of C623 and IC621 pin 9 increase.

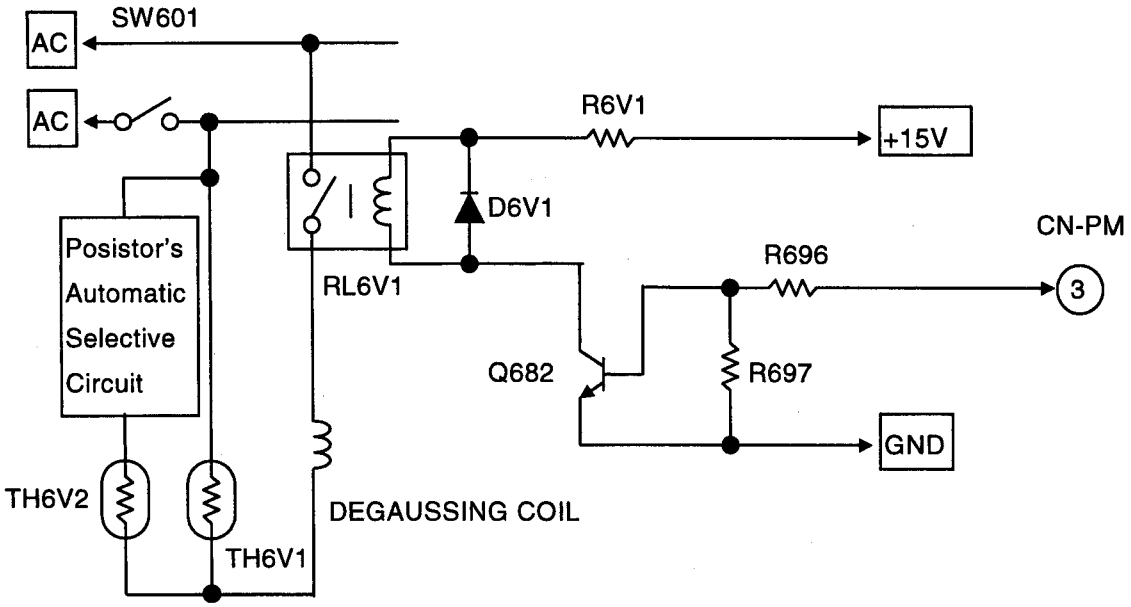
This action will stop the oscillator with in IC.



(Fig.8-6) Over Voltage Protection

7) Degaussing Circuit

When the power switch turns on, or when user accesses the OSM degauss control, the current flows from CN-PM pin 3 to the base of Q682. Then Q682 and RL6V1 turn on for 3 seconds.



(Fig.8-7) Degaussing Circuit

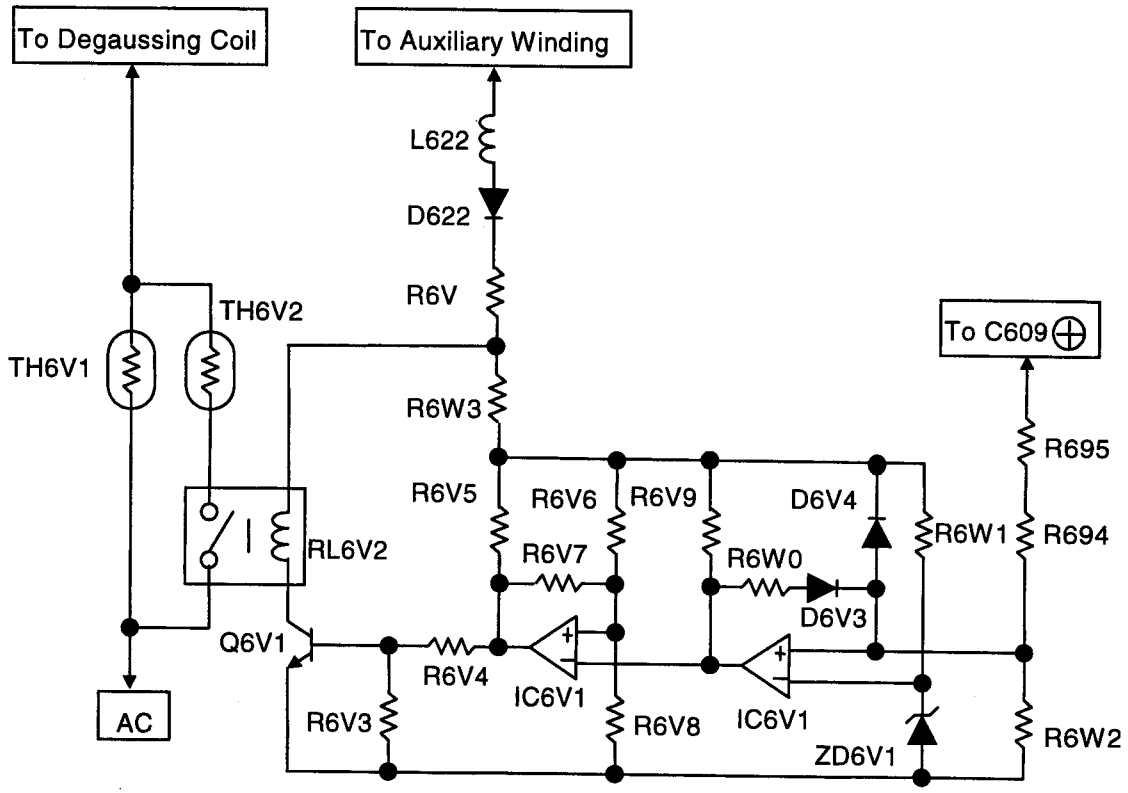
8) Posistor's Automatic Selective Circuit

When the power switch is turn on, the voltage of C609 is detected by IC6V1.

If it is less than DC 150V, IC6V1 output is high. This will cause Q6V1 and RL6V2 to turn on.

Then the posistor TH6V2 is connected in parallel with TH6V1.

If the voltage of C609 is more than DC 150V, IC6V1 output is low. This will cause Q6V1 to turn off, and the posistor TH6V2 is not connected.



(Fig.8-8) Posistor's Automatic Selective Circuit

9) Over Current Protection

If some failure occurs and the total power of secondary outputs increase, the peak voltage of IC621 pin 6 increases proportionally.

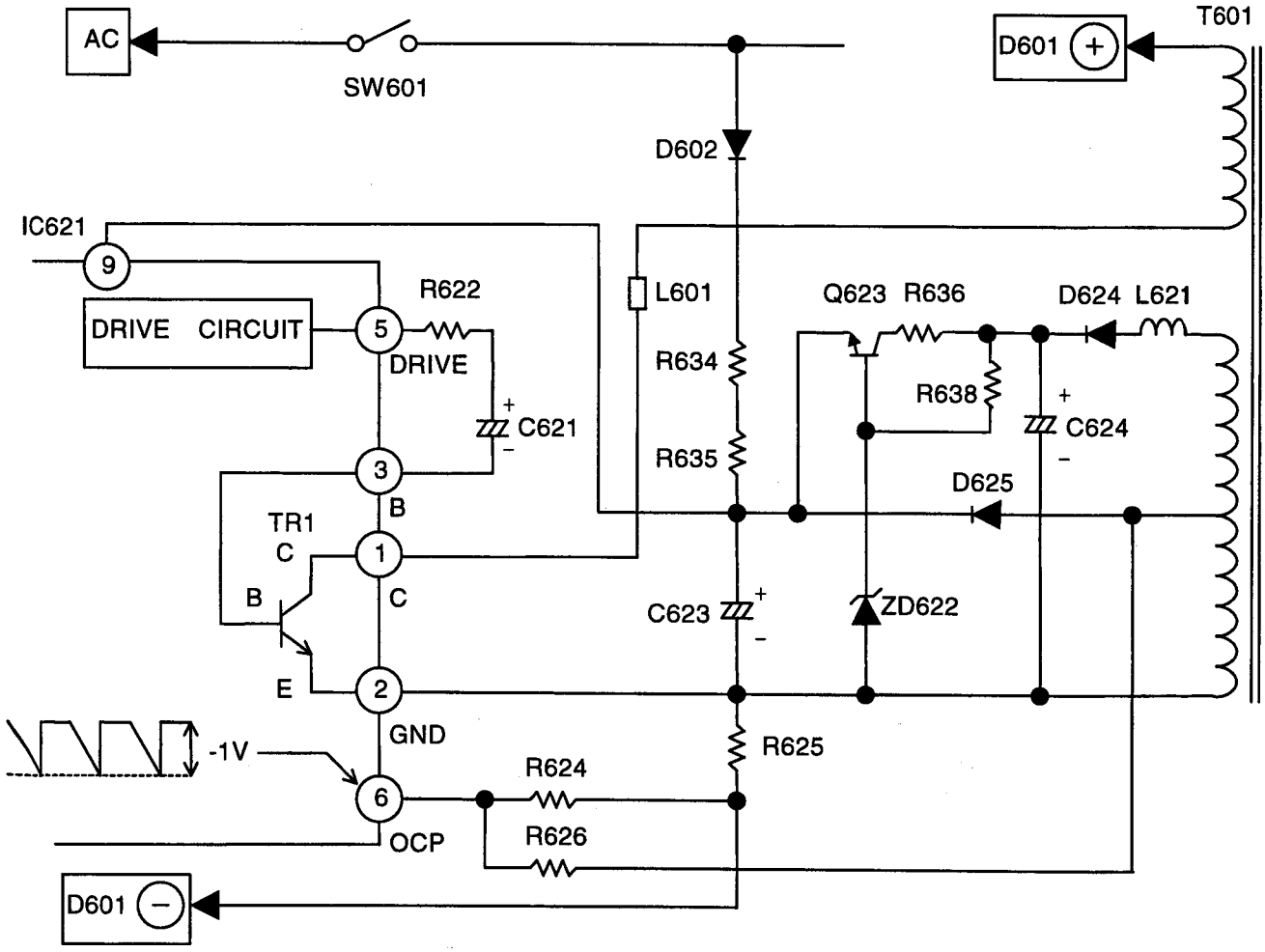
And when the peak voltage of IC621 pin 6 reaches -1V, IC621 decreases ON period duty cycle of TR1(internal IC621).

And also the voltage of secondary outputs and the voltage of auxiliary winding of T601 decrease.

When the auxiliary winding T601 decreases below 5V, IC621 operation stop.

But the charging current flows into the capacitor C621 through R634, R635 and IC621 operation start when the voltage of IC621 pin 9 reaches 8V by this action.

So IC621 repeats the intermittent oscillation.



(Fig.8-9) Over Current Protection

10) Power Management System Circuit

When the horizontal and vertical Sync. are missing, the voltage of CN-PM pin 2 becomes low level and Q673 turn off and Q672 turn on.

As current flows via R673, R675 and D673 into a PC621 when Q672 turns on, each output voltage starts lowering and becomes stable. When the voltage of C671 "+" terminal (about +80V at normal output voltage), reduced to about +11V in this event.

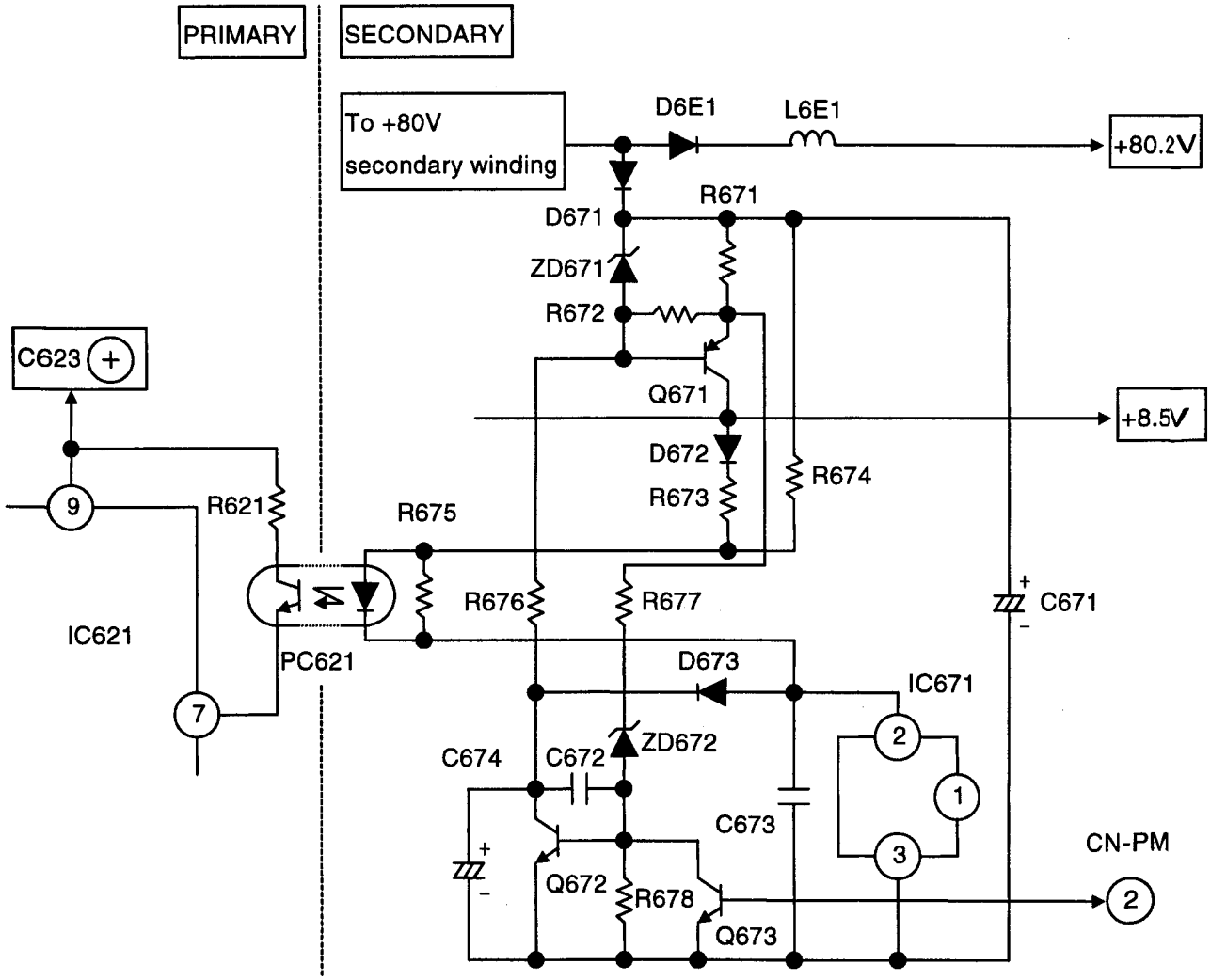
The stable power source for IC801 can be established by supplying C671 "+" terminal through R671 and Q671 while Q672 in on.

This is "SUSPEND STATE" and "OFF STATE" condition.

When the horizontal and vertical Sync applies again, the voltage of CN-PM pin 2 becomes high and Q673 turns on and Q672 turns off.

At this time, each output voltage rise and becomes stable at the normal output voltage.

And "ON STATE" is achieved.



(Fig.8-10) Power Management System Circuit

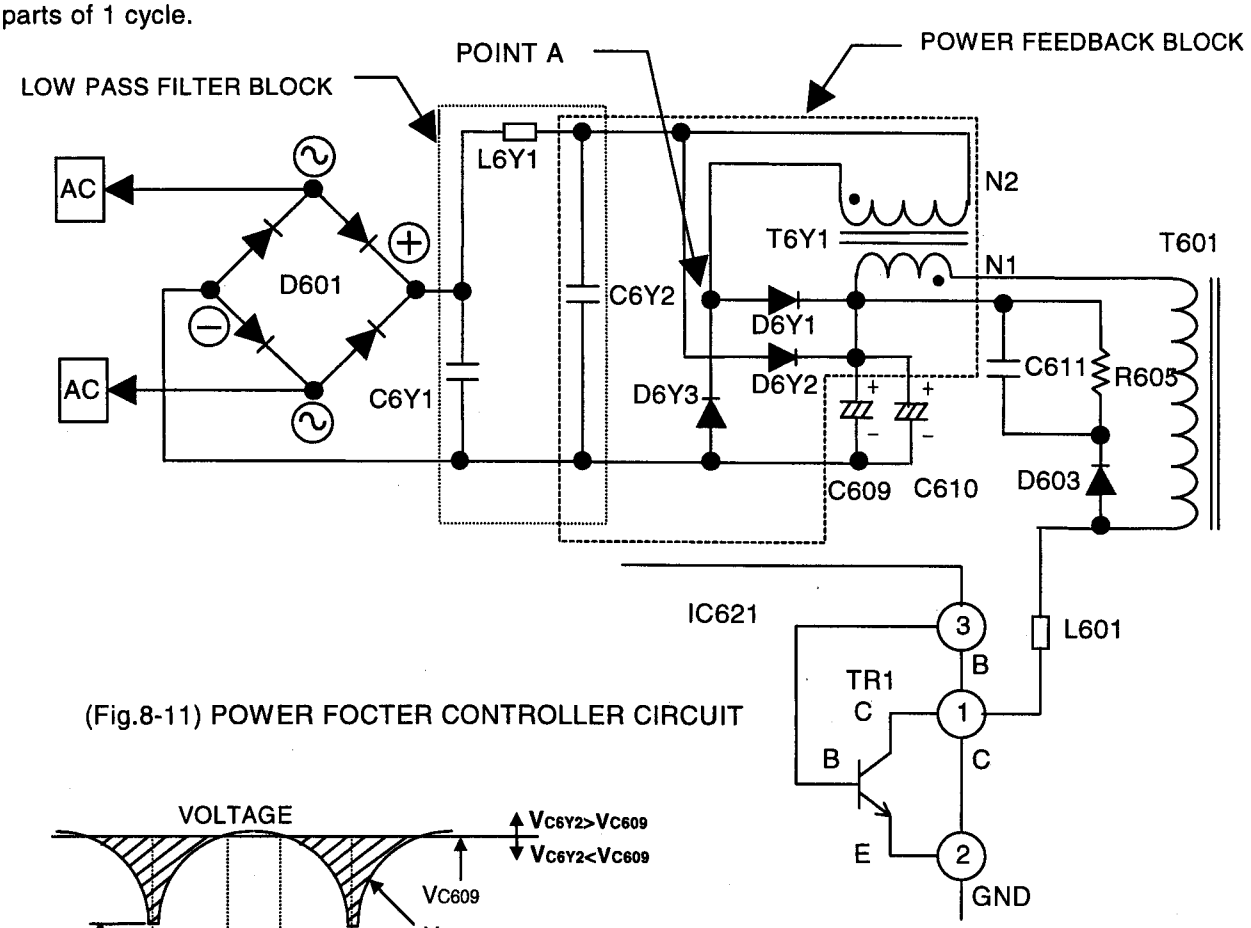
11) Power Factor Controller Circuit

This circuit is composed of Low pass filter block and Power feedback block. AC input is rectified by D601,then it charge C6Y2, C609 and C610.

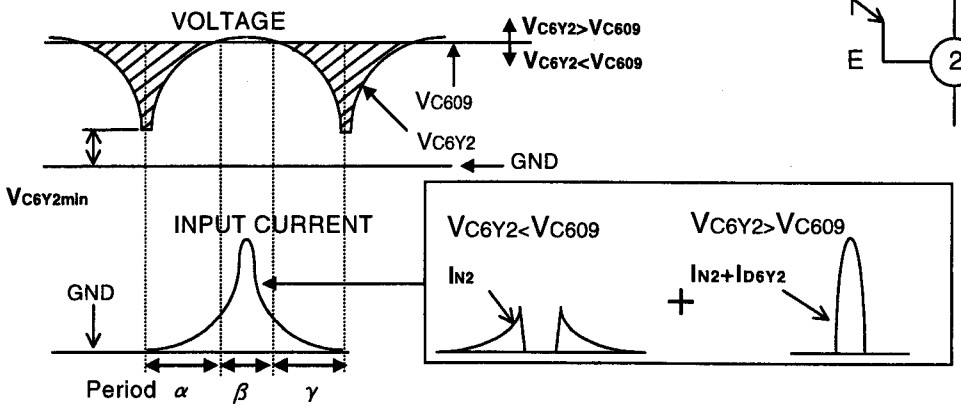
C609 is not charged during period α and period γ from input voltage directly,because the voltage of C6Y2 is smaller than the voltage of C609. Then, C609 is charged during period α and period γ by Power feedback block.When TR1(internal IC621) turn on, the N1 winding of T6Y1 is charged with energy.When TR1(internal IC621) turn off, the N2 winding of T6Y1 discharge energy. So, the voltage of point A is the part of slant line(Fig.8-12 : VC609-VC6Y2).And C609 is charged with feedback energy during period α and period γ, because the voltage of point A is bigger than the voltage of C609.

C609 is charged during period β (Fig.8-12) from input voltage directly.(Power supply which doesn't have "Power Factor Controller Circuit" is only charged during this period.)

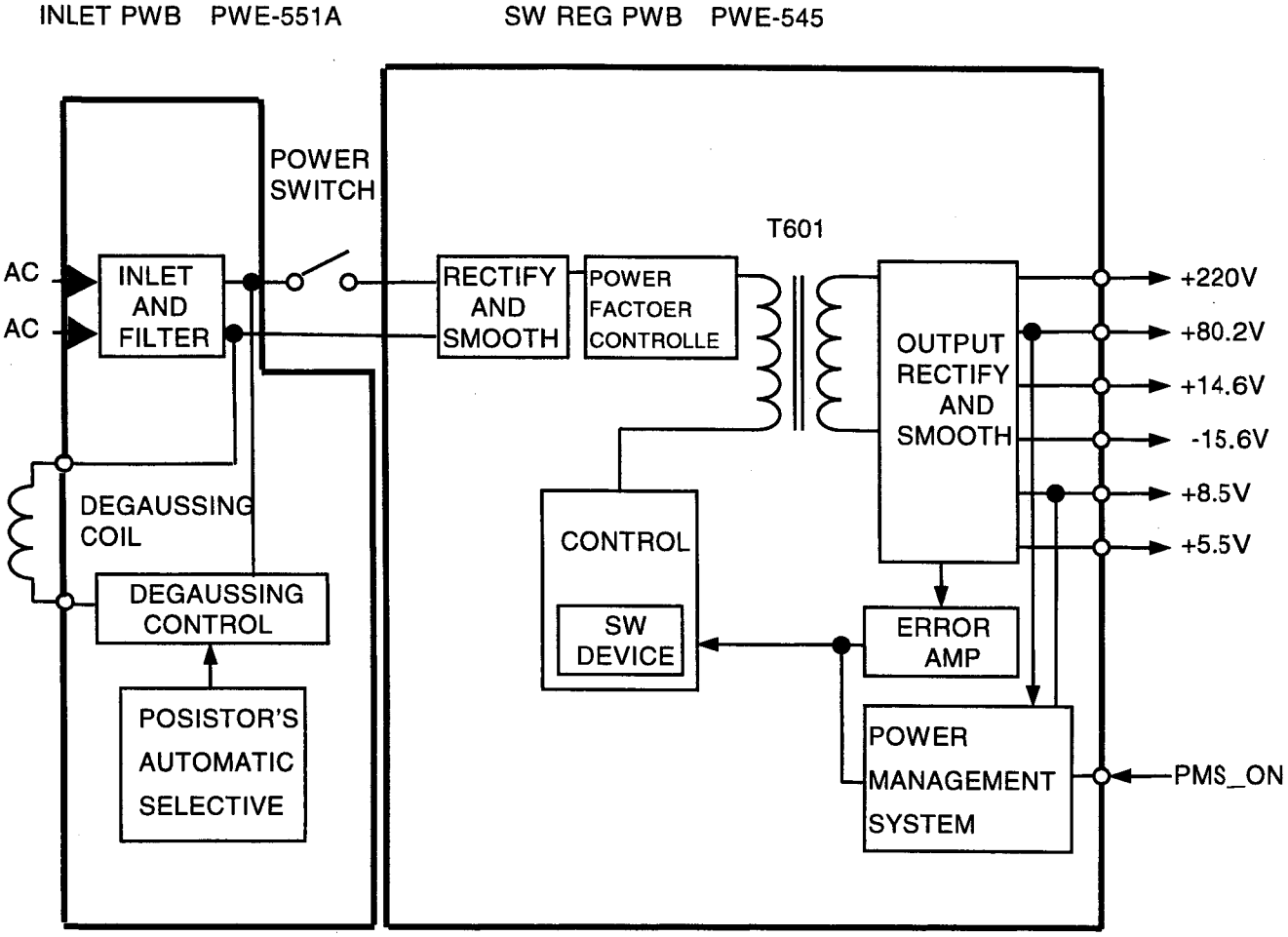
Finally,the voltage of C609 and input current become Wave of Fig.8-12.The harmonic current is decrease, and Power Factor is improved. Because C609 is charged not only period β but also many parts of 1 cycle.



(Fig.8-11) POWER FOCTER CONTROLLER CIRCUIT



(Fig.8-12) VOLTAGE · INPUT CURRENT



9. STATIC CONVERGENCE CORRECTION CIRCUIT

The static convergence correction circuit operates by adjusting the DC current flowing at both (the horizontal and vertical convergence correction) coils which are constructed on the deflection yoke.

The DC current is controlled by the D/A converter output voltage. The current changes direction at the center voltage (2.5V) of the D/A converter output voltage (0V ~ 5V). This current flows to the feedback resistors (R8H3 , R8J3), and is detected as voltage at the feedback resistors. This voltage is fed back to IC8H1 as the D/A converter control voltage.

10. AUTO and MANUAL EARTH MAGNETIC FIELD CORRECTION CIRCUIT

EARTH MAGNETIC FIELD CORRECTION CIRCUIT compensates automatically for purity problem of the north and south magnetic field.

1)Receive Part

Magnetic sensor (IC4H1)is used in this circuit.

When the magnetic field change, the voltage of IC4H1 pin5 (CNPU2 pin 3)varies.

This voltage is fed to the A/D converter in IC801 (pin 56).

And the reference voltage of Magnetic sensor(IC4H1 pin 7)is fed IC801(pin 57) too.

(Fig.10~12)

2)Purity correction Part

MPU controls output voltage by comparing the sensor voltage(IC801 pin 56) with the reference voltage (IC801 pin 57) and Globalsync OSD.

The D/A converter (IC4M1 pin 15) output center voltage is 2.5V and variable range is between 0V and +5V.

The DC output current flows in the EMF (Earth Magnetic Field) coil.

This current flows to the feedback resistor.(R4J3)

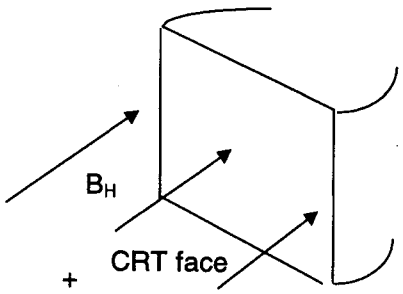
This current is detected as voltage at the feedback resistor.

NOTE) :During DEGAUSS, becomes Low level(D/A converter output voltage is 2.5V) , therefore the current doesn't flow in the EMF coil.

And it prevents magnetization in the CRT.

Magnetic Field	IC4H1 pin5 Voltage-IC4H1 pin7 Voltage	IC4M1 pin15 voltage(Not use OSD)
30uT	0.5V	1.5V
0uT	0V	2.5V
-30uT	-0.6V	3.7V

Fig.10 The example of purity correction voltage



3)Rotate correction Part

MPU controls output voltage by comparing the sensor voltage(IC801 pin56) with the reference voltage (IC801 pin57) and ROTATE OSD.

The D/A converter (IC4M1 pin14) output center voltage is 2.5V and variable range is between 0V and +5V.

The DC output current flows in the Z coil.(CNZDY)

This current flows to the feedback resistor.(R4K5)

This current is detected as voltage at the feedback resistor.

NOTE) :During DEGAUSS, becomes Low level(D/A converter output voltage is 2.5V),

Magnetic Field	IC801 pin56 Voltage-IC801 pin57 Voltage	IC4M1 pin14 voltage(Not use OSD)
30uT	0.5V	2.9V
0uT	0V	2.5V
-30uT	-0.6V	2.0V

Fig.11 The example of rotate correction voltage

4)Vertical Convergence correction Part

MPU controls output voltage by comparing the sensor voltage(IC801 pin56) with the reference voltage (IC801 pin57)and VERTICAL CONVERGENCE OSD.

The D/A converter (IC4M1 pin13) output center voltage is 2.5V and variable range is between 0V and +5V.

The DC output current flows in the V_CONVER coil. (CNSC pin3 to pin4)

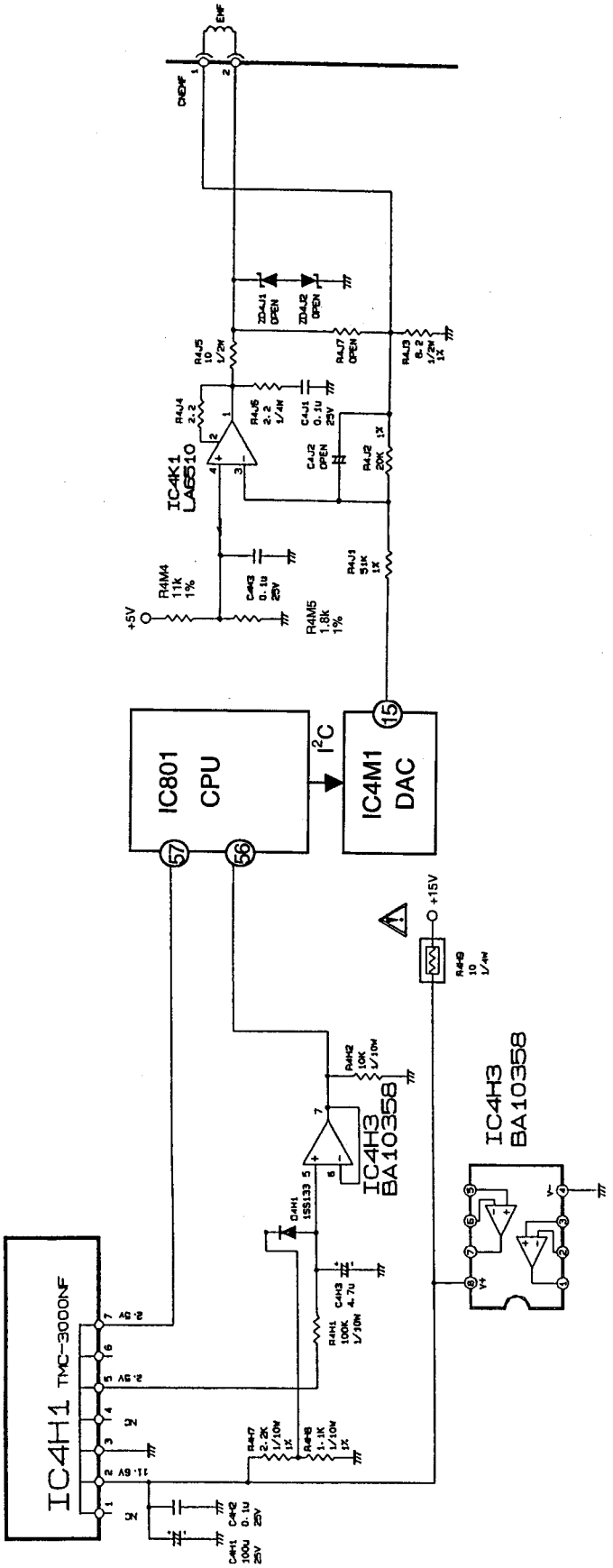
This current flows to the feedback resistor.(R8J3)

This current is detected as voltage at the feedback resistor.

NOTE) :During DEGAUSS, becomes Low level(D/A converter output voltage is 2.5V),

Magnetic Field	IC801 pin56 Voltage-IC801 pin57 Voltage	IC4M1 pin13 voltage(Not use OSD)
30uT	0.5V	2.54V
0uT	0V	2.5V
-30uT	-0.6V	2.46V

Fig.12 The example of VERTICAL CONVERGENCE correction voltage



EARTH MAGNETIC FIELD CORRECTION CIRCUIT

11.TCO CIRCUIT

TCO circuit consists of two circuit blocks. One is HV cancel circuit and the other detection and cancel circuit.
TCO circuit decreases the alternating electric fields in front of CRT to meet TCO'95 agreement.

TCO'95 Requirement(Alternating electric fields)

Frequency range	TCO compulsory value
5Hz-2kHz (ELF)	≦ 10V/m
2kHz-400kHz(VLF)	≦ 1V/m

VIDEO : All H pattern

Contrast/Brightness setting : OSM center position

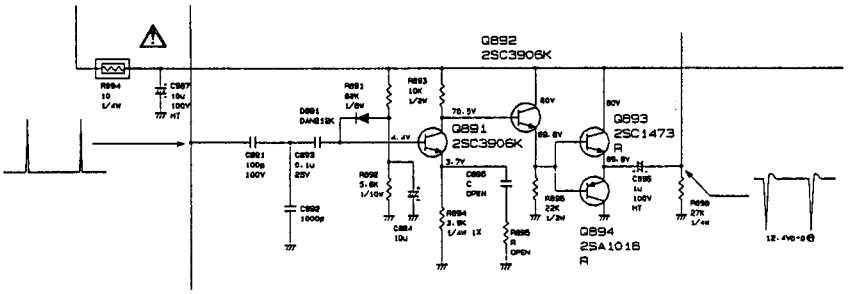
ELF : measured at 30cm in front of the screen

VLF : measured at 30cm in front of the screen and 50cm around the display

1)HV cancel circuit

HV cancel circuit consist of the Amplifier and the Buffer.

AFC pulse is putted into HV cancel circuit through C891 and then amplified and inverted by Q891.And this signal(cancel pulse) is putted into FBT(T5R1).This canceling pulse is opposite in polarity to the pulse which is on HV. This canceling pulse cancels the pulse which is caused by alternating electric field on HV.



(Fig 11.1) HV. cancel circuit

2)Detection and cancel circuit

Detection and cancel circuit consists of detection circuit and amplifier circuit.

Detection circuit detects the alternating electric fields in the front of CRT by the PWB(TCI-PWB) placed in the front panel. The impedance of TCI-PWB is very high (750KΩ),because detection circuit must detect alternating electric fields precisely.

The detected signal is amplified and inverted at IC8K1, and is input to cancel circuit through C865.

Q861,Q862 and parts around them form the cancel circuit. This circuit is high gain and negative feedback amplifier and creates pulse which is opposite to the detected electric fields. This cancel pulse radiates from TCOL,TOCT and TCOR-PWB and cancels alternating electric fields in front of CRT.

This cancel pulse consists of the same element as the original alternating electric fields that radiates from CRT and polarity is opposite. So this cancel pulse cancels alternating electric fields in front of CRT.

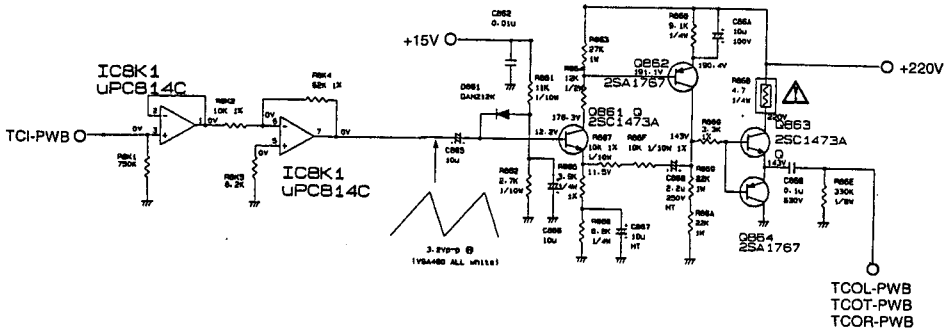


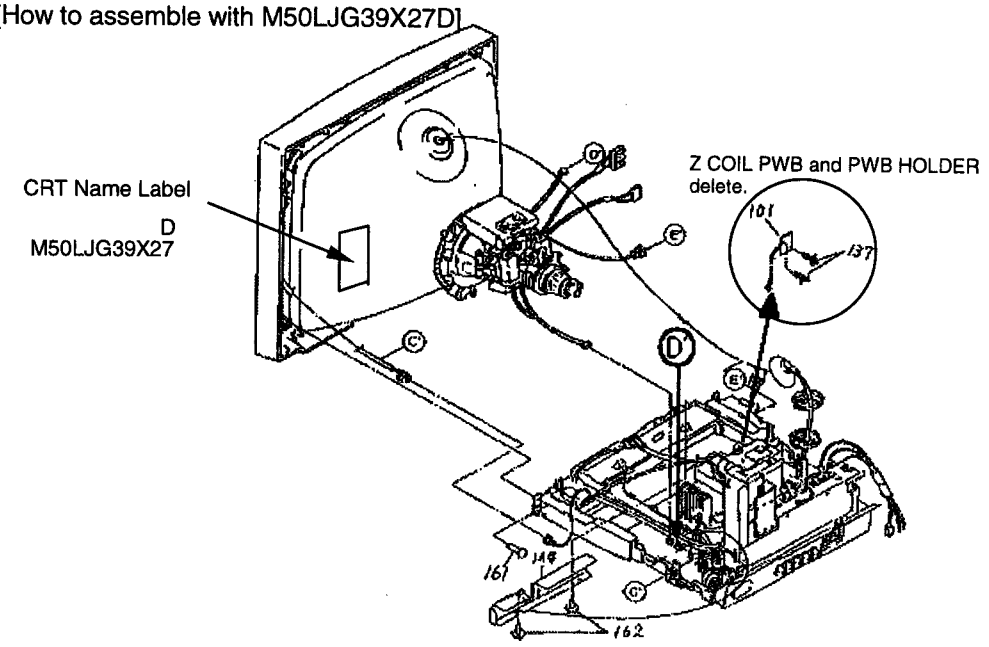
Fig 11.2 Detection and cancel circuit

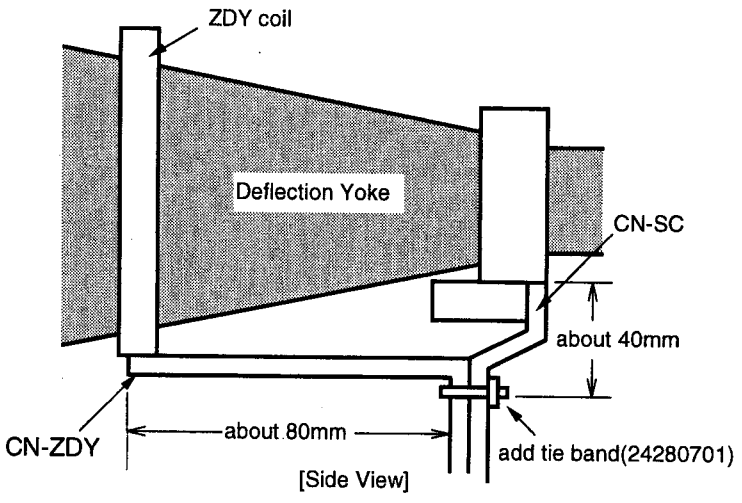
PARTS DIFFERENCE LIST

Two kind of CRT are applied in the model JC-2148UMW(A)/(B)/(AS)).
Some parts should be changed with the kind of the CRT.
See the following list.

	JC-2148UMW(A)/(B)/(AS))			
	CRT NAME LABEL : **M50LJG39X27N**		CRT NAME LABEL : **M50LJG39X27D**	
Symbol	Description	Parts No.	Description	Parts No.
CRT	CRT M50LJG39X27	33021511	CRT M50LJG39X27	33021522
	DEF PWB ASSY	847A2D01	DEF PWB ASSY	847A3D01
C574	C,FILM 250V 0.30UF 5%	42816380	C,FILM 250V 0.33UF 5%	42816358
C575	C,FILM 250V 0.082UF 5%	42816350	C,FILM 250V 0.091UF 5%	42816375
C576	C,FILM 250V 0.13UF 5%	42816377	C,FILM 250V 0.15UF 5%	42816353

[How to assemble with M50LJG39X27D]





REPLACEMENT PARTS LIST

The components specified for Model JC-2148UMW (A)

Note: The components identified by ⚠ make are critical for safety.
Replace only with parts Number specified.

SYMBOL	PARTS NO	DESCRIPTION
*** CRT & TUNER ***		
⚠CRT	33021511	CRT M50LJG39X27
*** ICS ***		
IC571	37REH024	MOS M62320FP-D-T2
IC591	370AA067	IC BA10324AF-E2(OP-AMP)
IC5A1 IC522	370AA092	IC BA4558F-E2(OP-AMP)
IC533 IC952	370AA113	IC BA10358F-E2 (OP-AMP)
IC521	370EF021	IC CA0007AM-T
IC531	370EF031	MOS M62393FP-D
IC532	370EF032	MOS M62392FP-D
IC512	370EF033	MOS HD14040BFP-EL
IC541	370E3120	MOS HD74HC74FP-EL
IC511	370E6178	IC BA14741F-E2
IC8G2	370K5002	IC UPC78L05J-T
IC481	37005221	IC UPC78M09AHF
IC471	37005250	IC UPC78M12AHF
IC8G1	37005277	IC PQ05RR13 (REG)
IC401	37006022	IC LA7846N
IC501	37009036	IC UPC1883ACT
IC4K1 IC8H1	37011003	IC LA6510
IC8K1	37011247	IC UPC814C (OP-AMP)
IC742	37011354	IC K1A324P
IC951	37011363	IC M52723SP
IC721	37011380	IC VPS16
IC731	37011391	IC M52755SP
IC711	37011392	IC M52742SP
IC802	37055589	MOS M24C08-BN6
IC6V1	37056615	IC BA10393
IC4H3	37056616	IC BA10358
IC4M1 IC751	37076176	MOS M62393P
IC7A1	37076304	IC M52347SP
IC671	37076357	IC SE080N(LF12)
IC8A1	37076381	MOS 24LCS21A-I/P
IC791	37076402	MOS LSC4501P2
⚠IC621	37076406	IC STR-S6729A(LF953)
IC7F1	37076408	IC SI-3062FA
IC592	37076409	IC BA9757
IC801	37076414	MOS UPD78015FYCW

SYMBOL	PARTS NO	DESCRIPTION
Q741B Q741G Q741R	350J5205	TR 2SC3415S-TP
Q781		
Q982	350J5241	TR 2SC2389S-TP R
Q987	350J5262	TR 2SC4620 P-TV2
Q5X1 Q5X2	350K4112	TR 2SA916-T L
Q894	350K5218	TR,2SA1018-TA R
Q671	35030000	TR 2SB1626
Q985	35030012	TR 2SB1186A E
Q581	35072612	TR 2SD2396 J
Q5A1	35072720	TR 2SD1889
Q984	35072752	TR 2SD1763A E
Q624 Q625	35092400	TR 2SC3852A
Q623	35095270	TR 2SC2317
⚠Q561	35095411	TR 2SC5453
Q8G6	351G0580	TR DTC114ESA-T
Q5G1	35127790	TR 2SJ449
Q572 Q573	35128003	TR 2SK2098-01MR(F119)
⚠Q5R1	35128009	TR 2SK2645-01MR(F111)
Q555	35128023	TR IRLS530A
MQ571	35135000	TR SLA5046 (FET-ARRAY)
⚠CR601	35595026	TRIAC AC10FSM
Q672	359D7406	TR 2SC1845-T F
*** DIODES ***		
MD701B MD701G MD701R MD702B MD702G MD702R MD712	36CB0054	DIODE DA204K-T
D721B D721G D721R D722B D722G D722R D784	36CB0072	DIODE HSM83-TL
MD711 MD771 MD8G1	36CB0079	DIODE DAN202K-T146(0°)
⚠D2002 ⚠D5P1 D861	36CB0213	DIODE DAN212K-T146
D891 D981 D982 D984		
D8A1	36CB0233	DIODE RB411D-T146
ZD671	360A0021	DIODE MTZJ3.6B T-72
ZD981	360A0026	DIODE MTZJ4.3A T-72
ZD521	360A0035	DIODE MTZJ5.1B T-72
ZD701 ZD702 ZD703 ZD704 ZD8A1 ZD8A2 ZD951	360A0039	DIODE MTZJ5.6B T-72
ZD5E1 ZD5X1	360A0043	DIODE MTZJ6.2B T-72
ZD622	360A0052	DIODE MTZJ7.5C-T72

SYMBOL	PARTS NO	DESCRIPTION
*** TRANSISTORS ***		
Q101 Q102 Q531 Q546 Q554 Q7E3 Q732 Q771 Q8A4 Q8G3	35AB0313	TR 2SA1037AK-T146 R
Q7Y1 Q7Y3 Q7Y5 Q7Y7	35AB1592	TR 2SA1434-TB
⚠Q5F1	35AB1596	TR 2SA1514K S-T
Q8G1	35BB1274	TR 2SB1197K R-T146
Q682	35CB0012	TR 2SC1623-T1B L6
Q411 Q5E1 ⚠Q5F3 Q501 Q545 Q553 Q7A2 Q7E2 Q7E4 Q7E5 Q735 Q772 Q793 Q795 Q8A1 Q8A3 Q8G2 Q8G5 Q951	35CB1113	TR 2SC2412K-T146 R
Q791 Q792 Q796	35CB2385	TR 2SC3735-T1B B34
Q7E1	35CB2393	TR 2SC3757 R-TX
Q7Y2 Q7Y4 Q7Y6 Q7Y8	35CB2468	TR 2SC3624-T1B-L18
Q891 Q892 Q981	35CB2491	TR 2SC3906K-E2
⚠Q5F2 ⚠Q5F4 Q543 Q544	35EB0212	TR DTA114WKA-T146
Q511 Q512 Q513 Q542 Q571 Q574 Q673 Q734 Q797 Q802	35EB0229 35EB0230	TR DTC143EKA-T146 TR DTC114EKA-T146
Q7A1 Q733 Q794 Q8A2 Q8G4	35EB0232	TR DTC144EKA-T146(0°)
Q103 Q104	35EB0238	TR DTC114YKA-T146
Q721B Q721G Q721R Q722B Q722G Q722R Q8A5 Q8A6	35KB2498	TR 2SK3018-T106
Q862 Q864	350A1500	TR 2SA1767-TA
Q983	350A2001	TR 2SA1038S-TP R
Q6V1	350D7216	TR 2SC945-T P
Q6P1 Q621	350E3218	TR 2SC1740S-T R
Q711B Q711G Q711R	350H0200	TR 2SC2407A-T
Q893	350H4418	TR,2SC1473-TA R
Q622 Q861 Q863	350J4817	TR 2SC1473A-TA Q

SYMBOL	PARTS NO	DESCRIPTION
ZD672	360A0054	DIODE MTZJ8.2A T-72
ZD592	360A0055	DIODE MTZJ8.2B T-72
ZD5G1	360A0059	DIODE MTZJ9.1B T-72
ZD721	360A0060	DIODE MTZJ9.1C T-72
ZD412	360A0071	DIODE MTZJ12A
ZD6P1 ZD621	360A0072	DIODE MTZJ12B
ZD552	360A0080	DIODE MTZJ15B-T72
⚠ZD5F1	360A0091	DIODE MTZJ20A
ZD5A1	360A0119	DIODE MTZJ33D-T72
D4H1 D4H2 D411 D5E3 D5G1 D541 D542 D571 D574 D593 D6V1 D6V2 D6V3 D6V4 D7E1 D7E2 D7E3 D714 D771 D781 D782 D791 D792 D8G1 D8G4 D8K1 D8K2 D801 D951 D952	360K1025	DIODE 1SS133
ZD623	360K3116	DIODE RD4.7EB(3)-T4
ZD6G1 ZD6H1	360K3120	DIODE RD24EB(3)-T4
ZD6V1	360K3638	DIODE RD5.6ESB(1)-T4
ZD6V2	360K3664	DIODE RD10ES AB3-T4
D8G5	361K7051	DI 1SR139-400 T31
D603	361K7174	DIODE RU1P V1
D624	361K7505	DIODE ERB44-06V1
D6P1 D6P2 D602	361K7523	DIODE ERA15-04V1
D552 D7K1	361K7562	DIODE EGP10G G23
⚠D5R2	361K7606	DIODE ERB44-08 V1
D5E1 D5E2 D741B D741G D741R D783	361K7777	DIODE 1SS244-T72
D401 D591 D592	361K7778	DIODE PR1004G,AT52
⚠D2001 ⚠D5R3 ⚠D5R4 ⚠D5X1	361K7822	DIODE DINL20,AT52
D6K1 D604 D622 D623 D625 D626 D629 D672 D673	361K7823	DI ERA18-02-V1
D6Y3 D627 D628	361K7842	DIODE ERB38-06(V1)

SYMBOL	PARTS NO	DESCRIPTION
D5A1 D5A2 D5G3 D5G4 D512	361K8252	DI RB721Q-40T72
⚠D5R1	36107308	DIODE ERC20M-08
D6Y2	36107701	DIODE RU4AM(LF-K2)
D6F1	36107729	DIODE YG901C2
D551	36107771	DIODE FE5DL-6596
D553	36107775	DIODE RX3Z(LF014-102)
D5G2	36107792	DIODE YG911S3R
D6G2 D6H1	36107832	DI ERC30-01(L3)
D6A1	36107835	DI RU3C(LF-C4)
D6E1 D6Y1	36107841	DIODE FMU-G16S
D671	36107844	DIODE RU3A(LF-C4)
⚠D561	36107846	DIODE FMC-28UA
⚠D601	36108116	DIODE KBU605G-FA1
⚠D562	36108250	DIODE FMQ-G5FS
LED111	36801021	LED SML19416W-LF36
⚠TH6V1	38112071	POSISTOR (PTH451A180M270A
⚠TH6V2	38112072	POSISTOR (PTH451ABG3R0Q14
⚠PC6P1 ⚠PC621	38200354	PHOTOCOUPLER PC123FY2
*** TRANSFORMERS ***		
T551	45804033	TRANS,H.DRAIVE
T981	45950006	D.F.TRANS(W515L)
⚠L562	46204008	COIL,CHOKE 4MH
L5G2	46206023	COIL,CHOKE 4MH
⚠T601	46311121	SWITCHING TRANS
T6Y1	46316102	SWITCHING TRANS
⚠T5R1	47105731	FBT(PCS)
⚠T561	47710025	TRANS,H.OUTPUT
*** VARIABLE RESISTORS ***		
VR581	410G1157	R,VARIABLE B1.0K
⚠VR5T1	415K5163	R,VARIABLE B200K
*** RELAYS & SWITCHES ***		
SW581	65161075	SWITCH SLIDE SSSF022-S09N
⚠SW601	65360060	PUSH SWITCH ESB91631AXL
SW108	65360067	PUSH SWITCH ESB30
SW101 SW102 SW103 SW104 SW105 SW106	65361012	TACT SWITCH

SYMBOL	PARTS NO	DESCRIPTION
*** PWB ASSYS ***		
	847A2A01	SW/HV PWB ASSY
	847A2B01	COMP PWB ASSY
	847A2C02	VIDEO PWB ASSY
	847A2D01	DEF PWB ASSY
	847A2T01	TCO PWB ASSY
*** ELECTRICAL PARTS & MISCELLANEOUS PARTS ***		
HD562	31709503	SHEET,INSULATOR
HQ561	31709507	SHEET,INSULATOR HEAT SINK
SG901B SG901G SG901R SG902	329JK047	ARRESTER
SG901B SG901G SG901R SG902	329J0047	ARRESTER (300V),AT52
CN-FG	32990205	INSULATING CAP TIC-3.5(YE
CNBNC	32990278	BNC-MDSUB PANEL
X801	64098039	X'TAL(10.000MHZ)
⚠F6H1	666J9141	FUSE 25102.5,AT52
⚠F671	666J9242	FUSE 25101.6,AT52
⚠F6T1	66671040	FUSE 250V 5A(215)
SG903 ⚠SG951	667K6007	SPARK GAP 1.5KV
CNCRT	70032275	CRT SOCKET HPS0720-015005
⚠IN6T1	70521069	INLET SK-1019(DELTA)
ADAPTE	70599171	ADAPTER(MAC),SXGA
CORD	70810778	POWER CORD U-3 L1.8 GRY,S
CABLE	73893255	SIGNAL CABLE MD15P-MD15P
IC4H1	79610568	UNIT,SENSOR TMC-3000NF-02
⚠ICD5P1	79644881	HV CONTROL UNIT
⚠IC2001	79645921	HV PROTECTOR UNIT
*** APPEARANCE PARTS ***		
	2E321561	CABINET BACK
	2E429591	REVOLVING STAND ASSY
	2E787682	NAME PLATE,INSTRUCTION
	2E787711	LABEL(CRA)(720G)
	2E788121	LABEL(CE)
	25321811	CABINET FRONT ASSY
	25546391	CHASSIS BASE
	25786161	LABEL(TCO95)
	25852641	SCREW,SPECIAL(5×25)

SYMBOL	PARTS NO	DESCRIPTION
SW107	65361012	TACT SWITCH
⚠RL571 ⚠RL572	65602052	RELAY DJ1-Q (12V)
⚠RL6V1 ⚠RL6V2	65660047	RELAY RPEF-12
*** COILS & FILTERS ***		
LC76E LC76L LC76R LC767 LC768	390J9028	FILTER ZJSC-R47-391TA
MRC801 MRC802	39040002	RC,NETWORK 10K 1K 0.01UF
⚠L571	60919182	COIL,H.LIN (13T/17T)
L791	610E1725	COIL,FILTER 47UH
L711	610E1729	COIL,FILTER 100UH
L622	610E4001	COIL,FILTER 10UH
L621	610E4006	COIL,FILTER 27UH
L901B L901G L901R	610FF502	COIL,FILTER 0.12UH
⚠L5R2	610F3014	COIL,FILTER 3.3UH
L6E1 L6H1 L6K1	610F3023	COIL,FILTER 33UH
L5G1 L763	610F3025	COIL,FILTER 47UH
⚠L561	610F3035	COIL,FILTER 330UH
L901B L901G L901R	610F6502	COIL,FILTER 0.12UH
LC903 L792 L793	610G0111	INDUCTOR,BEADS(FBR07HA121
⚠L5R1	610G0233	FILTER CHOKE PJ8T-470K
L6E2	610G0322	CHOKECOIL TSL0709-101KR66
L6F1 L6F2	610G0333	CHOKECOIL TSL1112RA-330K2
L6A1 L6H2	610G0335	CHOKECOIL TSL1112RA-680K1
⚠FL6T1 ⚠FL6T2	61062235	COIL,FILTER (LFZ2805V10)
L6Y1	61099161	COIL,CHOKE(SF-T12-75D-01)
⚠DEG	61321111	DEGAUSSING COIL(85T,5H)
EMF	61321309	COIL (85T,63H)
LC761B LC761G LC761R	616J9020	NOISE FILTER TX04200NB
L601 L602	616K5076	COIL,BEADS
LC763 LC764 LC765 LC766	616K6942	NOISE FILTER FILMAC TU20M
LC762B LC762G LC762R	616K6964	NOISE FILTER TX07250NBT
LC76M LC76N	616K6970	NOISE FILTER TY2E101MCT
LC76A LC76G LC76H	616K6971	NOISE FILTER TY2E103MCT
LC76K LC76P LC769 LC901 LC902		

SYMBOL	PARTS NO	DESCRIPTION
*** KNOBS & PUSH BUTTONS ***		
	2X456851	PUSH BUTTON(SW)(B)
*** PRINTED & PACKING MATERIALS ***		
	2E833831	SHEET PROTECTION
	2E835231	FILLER(T).CARTON
	2E835241	FILLER(B).CARTON
	2E835281	PLATE,PULL OUT
	2E835291	CARTON BOX(CN724A)
	24282111	BUSHING,INSULATOR
	24813191	BAG,POLYETHYLENE(150×370)
MANUAL	78133692	MANUAL CN724A USA
*** RESISTORS ***		
J402 J405 J406 J407 J417 J424 J425 J426 J427 J7E2 J7E3 J7E4	40AAD100	R,CHIP 0.0H 5% 1/2W
R904	40AAD133	R,CHIP 22H 5% 1/2W
R8A2 R8A4	40AAD146	R,CHIP 75H 5% 1/2W
R8A9	40AAD151	R,CHIP 120H 5% 1/2W
R718B R718G R718R	40AAD159	R,CHIP 270H 5% 1/2W
R521 R728	40AAD163	R,CHIP 390H 5% 1/2W
R716B R716G R716R	40AAD165	R,CHIP 470H 5% 1/2W
R405	40AAD175	R,CHIP 1.2K 5% 1/2W
R7E1	40AAD189	R,CHIP 4.7K 5% 1/2W
R893	40AAD197	R,CHIP 10K 5% 1/2W
R864	40AAD199	R,CHIP 12K 5% 1/2W
R896	40AAD205	R,CHIP 22K 5% 1/2W
R74GB R74GG R74GR R742B R742G R742R	40AAD213	R,CHIP 47K 5% 1/2W
J401 J403 J408 J409 J410 J411 J413 J414 J415 J416 J418 J419 J420 J421 J422 J423 J429 J7A1 J7A2 J7A3 J7A4 J7A5 J7A6 J7A7 J7A8 J7A9 J7E1	40AA1000	R,CHIP 0H 5% 1/8W

SYMBOL			PARTS NO	DESCRIPTION
J7E5	J7E6	J7E7	40AA1000	R,CHIP 0H 5% 1/8W
J7E8	J7E9	J7F1		
J7F3	J7F4	J7F5		
J7F6	J7F8	J7F9		
J7G1	J7G2	J7G3		
J7G4	J7G5	J951		
J952				
R581			40AA1165	R,CHIP 470H 5% 1/8W
R81E			40AA1173	R,CHIP 1.0K 5% 1/8W
R411			40AA1185	R,CHIP 3.3K 5% 1/8W
R597			40AA1197	R,CHIP 10K 5% 1/8W
R595			40AA1205	R,CHIP 22K 5% 1/8W
⚠R5F6			40AA1207	R,CHIP 27K 5% 1/8W
R596			40AA1213	R,CHIP 47K 5% 1/8W
R50K			40AA1215	R,CHIP 56K 5% 1/8W
R891			40AA1219	R,CHIP 82K 5% 1/8W
R86E			40AA1233	R,CHIP 330K 5% 1/8W
R573	R574	R575	40AA1239	R,CHIP 560K 5% 1/8W
R576	R577	R578		
R783			40AA1245	R,CHIP 1.0M 5% 1/8W
R7K2			40AA2000	R,CHIP 0.0H 5% 1/4W
R402			40AA2001	R,CHIP 1.0H 5% 1/4W
R989			40AA2009	R,CHIP 4.7H 5% 1/4W
⚠R5P1	⚠R5P2		40AA2133	R,CHIP 22H 5% 1/4E
R57N	R57P		40AA2149	R,CHIP 100H 5% 1/4W
R503	R7EA	R7EE	40AA2165	R,CHIP 470H 5% 1/4W
R7E2	R7E6		40AA2189	R,CHIP 4.7K 5% 1/4W
R7E7			40AA2195	R,CHIP 8.2K 5% 1/4W
R412			40AA2197	R,CHIP 10K 5% 1/4W
R5X2			40AA2199	R,CHIP 12K 5% 1/4W
C50G	R507	R555	40AA3000	R,CHIP 0.0H 5% 1/10W
R7AA	R7F1	R71K		
R715B	R715G	R715R		
R803	R804	R805		
R806	R807	R808		
R809	R815	R831		
R962				
R5G3			40AA3109	R,CHIP 2.2H 5% 1/10W
R558	R582	R812	40AA3125	R,CHIP 10H 5% 1/10W
R813	R814			
R73WB	R73WG	R73WR	40AA3137	R,CHIP 33H 5% 1/10W

SYMBOL			PARTS NO	DESCRIPTION
R80A	R81F	R810	40AA3173	R,CHIP 1.0K 5% 1/10W
R811	R816	R817		
R952	R96A			
R504	R541	R542	40AA3175	R,CHIP 1.2K 5% 1/10W
R70E	R709			
R675	R7F2	R71A	40AA3177	R,CHIP 1.5K 5% 1/10W
R79X	R794			
R5E2	R639	R7E3	40AA3179	R,CHIP 1.8K 5% 1/10W
R7E8	R793	R8AJ		
R54A	R7A8	R739	40AA3181	R,CHIP 2.2K 5% 1/10W
R79A	R79W			
R401			40AA3182	R,CHIP 2.4K 5% 1/10W
R8G6	R801	R802	40AA3183	R,CHIP 2.7K 5% 1/10W
R862				
R50A	R7YF	R7Y3	40AA3185	R,CHIP 3.3K 5% 1/10W
R7Y6	R7Y9	R748B		
R748G	R748R	R8G2		
R52T	R696	R79F	40AA3187	R,CHIP 3.9K 5% 1/10W
R536	R672	R79L	40AA3189	R,CHIP 4.7K 5% 1/10W
R8GH				
R7AH	R7AK		40AA3190	R,CHIP 5.1K 5% 1/10W
R5AC	R5A7	R59K	40AA3191	R,CHIP 5.6K 5% 1/10W
R791	R892			
R772			40AA3193	R,CHIP 6.8K 5% 1/10W
R5G2	R775		40AA3195	R,CHIP 8.2K 5% 1/10W
R4H2	R4H6	R5A5	40AA3197	R,CHIP 10K 5% 1/10W
R5A6	⚠R5F5	⚠R5F8		
R51L	R514	R537		
R545	R547	R59L		
R603	R633	R747B		
R747G	R747R	R771		
R79E	R79H	R79M		
R79T	R79U	R799		
R8A5	R8A6	R8A7		
R8GA	R8G1	R8G3		
R8G7	R951	R955		
R956				
R861			40AA3198	R,CHIP 11K 5% 1/10W
R59F			40AA3199	R,CHIP 12K 5% 1/10W
R5A3			40AA3201	R,CHIP 15K 5% 1/10W
R8G8			40AA3203	R,CHIP 18K 5% 1/10W
⚠R5F7	R79N		40AA3205	R,CHIP 22K 5% 1/10W

SYMBOL			PARTS NO	DESCRIPTION
R73XB	R73XG	R73XR	40AA3137	R,CHIP 33H 5% 1/10W
R798				
R549			40AA3141	R,CHIP 47H 5% 1/10W
R70A	R70F		40AA3143	R,CHIP 56H 5% 1/10W
R736R			40AA3145	R,CHIP 68H 5% 1/10W
R736G			40AA3147	R,CHIP 82H 5% 1/10W
R502	R53A	R53C	40AA3149	R,CHIP 100H 5% 1/10W
R53E	R53F	R538		
R539	R556	R57A		
R57C	R57E	R57F		
R57J	R579	R71F		
R71G	R712	R721B		
R721G	R721R	R726B		
R726G	R726R	R727B		
R727G	R727R	R731		
R732	R733	R734		
R736B	R752	R753		
R795	R796			
R717B	R717G	R717R	40AA3151	R,CHIP 120H 5% 1/10W
R719B	R719G	R719R		
R509			40AA3153	R,CHIP 150H 5% 1/10W
R71H			40AA3155	R,CHIP 180H 5% 1/10W
R745B	R745G	R745R	40AA3157	R,CHIP 220H 5% 1/10W
R7YE	R7Y2	R7Y5	40AA3161	R,CHIP 330H 5% 1/10W
R7Y8				
R50E	R781		40AA3167	R,CHIP 560H 5% 1/10W
R543	R544	R621	40AA3169	R,CHIP 680H 5% 1/10W
R640	R673	R738		
R774				
R641	R901B	R901G	40AA3171	R,CHIP 820H 5% 1/10W
R901R				
R5E4	R5E5	R50C	40AA3173	R,CHIP 1.0K 5% 1/10W
R505	R511	R516		
R52H	R52J	R52K		
R52L	R52M	R52N		
R52R	R531	R532		
R546	R7AL	R7AM		
R7A1	R7A7	R7E9		
R71E	R72E	R72F		
R751	R773	R79G		
R797B	R797G	R797R		
R8AE	R8AF	R8G4		

SYMBOL			PARTS NO	DESCRIPTION
R548	R8A1	R819	40AA3207	R,CHIP 27K 5% 1/10W
R598	R782	R8AA	40AA3209	R,CHIP 33K 5% 1/10W
R8AH	R954			
R7A9			40AA3212	R,CHIP 43K 5% 1/10W
R678	R73A	R73Y	40AA3213	R,CHIP 47K 5% 1/10W
R79K	R79P	R79R		
R8A3	R8A8			
R953			40AA3217	R,CHIP 68K 5% 1/10W
R697			40AA3219	R,CHIP 82K 5% 1/10W
R4H1	R4H5	⚠R5F4	40AA3221	R,CHIP 100K 5% 1/10W
R5X3	R59J	R642		
R784			40AA3231	R,CHIP 270K 5% 1/10W
R7YA	R7Y1	R7Y4	40AA3233	R,CHIP 330K 5% 1/10W
R7Y7	R787	R990		
⚠R5F3	R8GF		40AA3235	R,CHIP 390K 5% 1/10W
R5A8			40AA3239	R,CHIP 560K 5% 1/10W
R785	R786		40AA3242	R,CHIP 750K 5% 1/10W
R8G5			40AA3243	R,CHIP 820K 5% 1/10W
R792			40AA3245	R,CHIP 1.0M 5% 1/10W
R5G1			40AA5141	R,CHIP 47H 5% 1/4W
R866	R993		40AA5193	R,CHIP 6.8K 5% 1/4W
R868			40AA5196	R,CHIP 9.1K 5% 1/4W
R898			40AA5207	R,CHIP 27K 5% 1/4W
R984			40AB1171	R,CHIP 820H 1% 1/8W
R506	R534		40AB1179	R,CHIP 1.8K 1% 1/8W
⚠R5U3			40AB1224	R,CHIP 130K 1% 1/8W
R865	R894		40AB2187	R,CHIP 3.9K 1% 1/4W
R724B	R724G	R724R	40AB3145	R,CHIP 68H 1% 1/10W
R624			40AB3149	R,CHIP 100H 1% 1/10W
R701B	R701G	R701R	40AB3153	R,CHIP 150H 1% 1/10W
R702B	R702G	R702R		
R703B	R703G	R703R		
R704B	R704G	R704R		
R101	R725B	R725G	40AB3155	R,CHIP 180H 1% 1/10W
R725R				
R535			40AB3163	R,CHIP 390H 1% 1/10W
R501	R723B	R723G	40AB3167	R,CHIP 560H 1% 1/10W
R723R				
R992			40AB3169	R,CHIP 680H 1% 1/10W
R104	R105		40AB3170	R,CHIP 750H 1% 1/10W

SYMBOL			PARTS NO	DESCRIPTION
R102	R103		40AB3173	R,CHIP 1.0K 1% 1/10W
R4H8	R508		40AB3174	R,CHIP 1.1K 1% 1/10W
R524			40AB3176	R,CHIP 1.3K 1% 1/10W
R50G	R527	R714	40AB3177	R,CHIP 1.5K 1% 1/10W
R50F			40AB3179	R,CHIP 1.8K 1% 1/10W
R4H7	R7A3		40AB3181	R,CHIP 2.2K 1% 1/10W
⚠R5U1	R518	R73F	40AB3183	R,CHIP 2.7K 1% 1/10W
R404			40AB3184	R,CHIP 3.0K 1% 1/10W
R59G	R722B	R722G	40AB3185	R,CHIP 3.3K 1% 1/10W
R722R				
R7A2			40AB3187	R,CHIP 3.9K 1% 1/10W
R526			40AB3189	R,CHIP 4.7K 1% 1/10W
R73E			40AB3191	R,CHIP 5.6K 1% 1/10W
R51A	R529	R967	40AB3193	R,CHIP 6.8K 1% 1/10W
R50H			40AB3196	R,CHIP 9.1K 1% 1/10W
R51C	R51F	R51T	40AB3197	R,CHIP 10K 1% 1/10W
R52C	R52E	R52F		
R52G	R52W	R59C		
R593	R86F	R867		
R957	R958	R959	40AB3198	R,CHIP 11K 1% 1/10W
R59M	R594	R713	40AB3199	R,CHIP 12K 1% 1/10W
R403	R51R	R517	40AB3200	R,CHIP 13K 1% 1/10W
R5X5			40AB3201	R,CHIP 15K 1% 1/10W
R522			40AB3202	R,CHIP 16K 1% 1/10W
R515	R591		40AB3203	R,CHIP 18K 1% 1/10W
R73G	R74AB	R74AG	40AB3205	R,CHIP 22K 1% 1/10W
R74AR				
R59E			40AB3207	R,CHIP 27K 1% 1/10W
R971	R972	R973	40AB3209	R,CHIP 33K 1% 1/10W
R974				
R74EB	R74EG	R74ER	40AB3211	R,CHIP 39K 1% 1/10W
R51E	R51G		40AB3212	R,CHIP 43K 1% 1/10W
R52A	R528	R963	40AB3213	R,CHIP 47K 1% 1/10W
R7AG			40AB3214	R,CHIP 51K 1% 1/10W
R525	R629	R630	40AB3217	R,CHIP 68K 1% 1/10W
⚠R5U2	R519	R749B	40AB3219	R,CHIP 82K 1% 1/10W
R749G	R749R			
R59A	R746B	R746G	40AB3221	R,CHIP 100K 1% 1/10W
R746R				
R74FB	R74FG	R74FR	40AB3222	R,CHIP 110K 1% 1/10W

SYMBOL			PARTS NO	DESCRIPTION
R6V9	R6W1		401KE689	R,CARBON 4.7K 5% 1/6W
R6V5			401KE693	R,CARBON 6.8K 5% 1/6W
R8K5			401KE695	R,CARBON 8.2K 5% 1/6W
R6V3			401KE697	R,CARBON 10K 5% 1/6W
R6P2			401KE713	R,CARBON 47K 5% 1/6W
R6V6	R6V8		401KE721	R,CARBON 100K 5% 1/6W
R741B	R741G	R741R	401KE737	R,CARBON 470K 5% 1/6W
R8K1			401KE741	R,CARBON 680K 5% 1/6W
R6V7			401KE745	R,CARBON 1.0M 5% 1/6W
R4J4	R4K9		401K5609	R,CARBON 2.2H 5% 1/6W
R8J4			401K5625	R,CARBON 10H 5% 1/6W
R8H4			401K5629	R,CARBON 15H 5% 1/6W
R4M2	R4M3		401K5649	R,CARBON 100H 5% 1/6W
R6W3			401K5663	R,CARBON 390H 5% 1/6W
R6K2	R6V4		401K5669	R,CARBON 680H 5% 1/6W
R4K6	R4M1	R6WO	401K5673	R,CARBON 1.0K 5% 1/6W
R676			401K5681	R,CARBON 2.2K 5% 1/6W
R6V9	R6W1		401K5689	R,CARBON 4.7K 5% 1/6W
R6V5			401K5693	R,CARBON 6.8K 5% 1/6W
R8K5			401K5695	R,CARBON 8.2K 5% 1/6W
R6V3			401K5697	R,CARBON 10K 5% 1/6W
R6P2			401K5713	R,CARBON 47K 5% 1/6W
R6V6	R6V8		401K5721	R,CARBON 100K 5% 1/6W
R741B	R741G	R741R	401K5737	R,CARBON 470K 5% 1/6W
R8K1			401K5741	R,CARBON 680K 5% 1/6W
R6V7			401K5745	R,CARBON 1.0M 5% 1/6W
⚠R636			40178143	R,CARBON 56H 5% 1/2W
⚠R5R1	⚠R5R2		40224137	R,WIRE 33H 5% 5W
⚠R602	⚠R606		40299104	R,WIRE 10H 5% 5W
R605			40299181	R,WIRE 56K 5% 5W
R622			40371103	R,METAL 1.2H 5% 1W
R7F5			40371109	R,METAL 2.2H 5% 1W
R8GE			40371113	R,METAL 3.3H 5% 1W
R561			40371125	R,METAL 10H 5% 1W
R583			40371129	R,METAL 15H 5% 1W
R584			40371131	R,METAL 18H 5% 1W
R559			40371133	R,METAL 22H 5% 1W
R8GG			40371147	R,METAL 82H 5% 1W
R5E3			40371187	R,METAL 3.9K 5% 1W

SYMBOL			PARTS NO	DESCRIPTION
R592			40AB3223	R,CHIP 120K 1% 1/10W
R5X4			40AB3226	R,CHIP 160K 1% 1/10W
R744B	R744G	R744R	40AB3227	R,CHIP 180K 1% 1/10W
R5A4			40AB3229	R,CHIP 220K 1% 1/10W
R599	R743B	R743G	40AB3233	R,CHIP 330K 1% 1/10W
R743R				
R523			40AB5223	R,CHIP 120K 1% 1/2W
R4J6	R4K3	R8H6	401CF609	R,CARBON 2.2H 5% 1/4W
R8J6				
R902B	R902G	R902R	401CF629	R,CARBON 15H 5% 1/4W
R6V1			401CF631	R,CARBON 18H 5% 1/4W
R903			401CF649	R,CARBON 100H 5% 1/4W
R6G2			401CF671	R,CARBON 820H 5% 1/4W
R905			401CF689	R,CARBON 4.7K 5% 1/4W
R631	R632		401CF731	R,CARBON 270K 5% 1/4W
R4J6	R4K3	R8H6	401C6609	R,CARBON 2.2H 5% 1/4W
R8J6				
R902B	R902G	R902R	401C6629	R,CARBON 15H 5% 1/4W
R6V1			401C6631	R,CARBON 18H 5% 1/4W
R903			401C6649	R,CARBON 100H 5% 1/4W
R6G2			401C6671	R,CARBON 820H 5% 1/4W
R905			401C6689	R,CARBON 4.7K 5% 1/4W
R631	R632		401C6731	R,CARBON 270K 5% 1/4W
⚠R6V2			401G6109	R,CARBON 2.2H 5% 1/4W
⚠R985	⚠R986		401G6141	R,CARBON 47H 5% 1/4W
⚠R5F2			401G6191	R,CARBON 5.6K 5% 1/4W
R4K4			401HE641	R,CARBON 47H 5% 1/2W
R4J5			401H5625	R,CARBON 10H 5% 1/2W
R4K4			401H5641	R,CARBON 47H 5% 1/2W
⚠R995			401H5677	R,CARBON 1.5K 5% 1/2W
R6P1			401H5727	R,CARBON 180K 5% 1/2W
⚠R6T1			401H5743	R,CARBON 820K 5% 1/2W
R4J4	R4K9		401KE609	R,CARBON 2.2H 5% 1/6W
R8J4			401KE625	R,CARBON 10H 5% 1/6W
R8H4			401KE629	R,CARBON 15H 5% 1/6W
R4M2	R4M3		401KE649	R,CARBON 100H 5% 1/6W
R6W3			401KE663	R,CARBON 390H 5% 1/6W
R6K2	R6V4		401KE669	R,CARBON 680H 5% 1/6W
R4K6	R4M1	R6WO	401KE673	R,CARBON 1.0K 5% 1/6W
R676			401KE681	R,CARBON 2.2K 5% 1/6W

SYMBOL			PARTS NO	DESCRIPTION
R677			40371199	R,METAL 12K 5% 1W
R86A	R869		40371205	R,METAL 22K 5% 1W
R863			40371207	R,METAL 27K 5% 1W
R5AE	R6A1	R6A2	40371221	R,METAL 100K 5% 1W
⚠R5R3			40371329	R,METAL 0.22H 5% 1W
R623			40371337	R,METAL 0.47H 5% 1W
⚠R5F1			40371339	R,METAL 0.56H 5% 1W
⚠R562			40372131	R,METAL 18H 5% 2W
R604			40372143	R,METAL 56H 5% 2W
R8J5			40372147	R,METAL 82H 5% 2W
R8H5			40372151	R,METAL 120H 5% 2W
R7E4			40372169	R,METAL 680H 5% 2W
R6E1			40372199	R,METAL 12K 5% 2W
R638			40372201	R,METAL 15K 5% 2W
R634			40372213	R,METAL 47K 5% 2W
R991			40372215	R,METAL 56K 5% 2W
R635			40372217	R,METAL 68K 5% 2W
R671			40373109	R,METAL 2.2H 5% 3W
R674			40373187	R,METAL 3.9K 5% 3W
⚠R571			40383028	R,METAL 180H 5% 3W
R55A			40399092	R,METAL 1.2H 5% 5W
R4M5			404CA679	R,METAL 1.8K 1% 1/6W
R626			404CA689	R,METAL 4.7K 1% 1/6W
R8K2			404CA697	R,METAL 10K 1% 1/6W
R4M4			404CA698	R,METAL 11K 1% 1/6W
R4J2	R4K2	R8H2	404CA704	R,METAL 20K 1% 1/6W
R8J2				
R4J1	R4K1	R8H1	404CA714	R,METAL 51K 1% 1/6W
R8J1				
R6W2			404CA715	R,METAL 56K 1% 1/6W
R8K4			404CA716	R,METAL 62K 1% 1/6W
⚠R5T2			404CA718	R,METAL 75K 1% 1/6W
⚠R5T1			404CA731	R,METAL 270K 1% 1/6W
R627	R628	R694	404CA745	R,METAL 1.0M 1% 1/6W
R695				
R8J3			404C1626	R,METAL 11H 1% 1/6W
R8H3			404C1631	R,METAL 18H 1% 1/6W
R4M5			404C1679	R,METAL 1.8K 1% 1/6W
R86G			404C1685	R,METAL 3.3K 1% 1/6W
R626			404C1689	R,METAL 4.7K 1% 1/6W

SYMBOL			PARTS NO	DESCRIPTION
R8K2			404C1697	R,METAL 10K 1% 1/6W
R4M4			404C1698	R,METAL 11K 1% 1/6W
R4J2	R4K2	R8H2	404C1704	R,METAL 20K 1% 1/6W
R8J2				
R4J1	R4K1	R8H1	404C1714	R,METAL 51K 1% 1/6W
R8J1				
R6W2			404C1715	R,METAL 56K 1% 1/6W
R8K4			404C1716	R,METAL 62K 1% 1/6W
R5T2			404C1718	R,METAL 75K 1% 1/6W
R5T1			404C1731	R,METAL 270K 1% 1/6W
R627	R628	R694	404C1745	R,METAL 1.0M 1% 1/6W
R695				
△R6K1			404E1329	R,METAL 0.22H 5% 1/4W
△R5A9			404J9509	R,METAL 470H 1% 1/4W
△R5E1	△R557		404J9510	R,METAL 2.2H 5% 1/4W
R4K5			404K2628	R,METAL 13H 1% 1/4W
R4J3			404K3623	C,METAL 8.2H 1% 1/2W
△R2001			404K5109	R,METAL 2.2H 5% 1/4W
△R86B			404K5117	R,METAL 4.7H 5% 1/4W
△R4M8			404K5123	R,METAL 8.2H 5% 1/4W
△R4H9	△R5A1	△R5X1	404K5125	R,METAL 10H 5% 1/4W
△R50J	△R51P	△R7E5		
△R994				
△R5P3			404K5149	R,METAL 100H 5% 1/4W
R406			40499440	R,METAL 1.0H 1% 1W
R983			40499449	R,METAL 10K 2% 1W
R625			40499462	R,METAL 0.12H 5% 3W
△R6G1			40499507	R,METAL 0.22H 5% 1/2W
△R6F1			40499508	R,METAL 0.1H 5% 1/2W

*** CAPACITORS ***

C80A	C80E	C80F	42AA1509	C,CHIP CERAMIC 50V 1000PF
C79G			42AA1515	C,CHIP CERAMIC 50V 3300PF
C742B	C742G	C742R	42AA1521	C,CHIP CERAMIC 50V 0.01UF
C862				
C748			42AA1538	C,CERAMIC 25V 0.1UF
C607			42AA2721	C,CERAMIC 50V 0.1UF
C471	C523	C529	42AA2726	C,CERAMIC 50V 0.01UF
C702B	C702G	C702R		

SYMBOL			PARTS NO	DESCRIPTION
C5E3	C7AE	C954	42CA1440	C,CERAMIC 50V 100PF
C955				
C79A			42CA1444	C,CERAMIC 50V 150PF
C7A8	C7E2	C722B	42CA1448	C,CERAMIC 50V 220PF
C722G	C722R			
C598			42CA1452	C,CHIP 50V 330PF
C8G1			42CA1454	C,CERAMIC 50V 390UF
C625			42CA1456	C,CERAMIC 50V 470PF
C892			42CA1464	C,CERAMIC 50V 1000PF
C891			42CE0115	C,CERAMIC 100V 100PF
△C57C			420C9066	C,CERAMIC 500V 1800PF
C902			420C9551	C,CERAMIC 500V 100PF
C901			420C9557	C,CERAMIC 500V 330PF
C553	C985	C988	420C9563	C,CERAMIC 500V 1000PF
C593			420C9567	C,CERAMIC 500V 2200PF
C554			420C9571	C,CERAMIC 500V 4700PF
C904			420D0019	C,CERAMIC 2KV 1000PF
△C6T2	△C6T3		420EJ013	C,CERAMIC 400V 1000PF
C622			420J8065	C,CERAMIC 1K 1200PF 10%
C864			420J9118	C,CERAMIC 500V 0.01UF
C903			4204K108	C,CERAMIC 2KV 0.01UF
△C608			42060330	C,CERAMIC 400V 2200PF
C8K1	C8K3		421A0425	C,CERAMIC 50V 0.01UF
C506			421C3335	C,CERAMIC 50V 470PF
C4M2	C6V2	C6V3	421C3479	C,CERAMIC 50V 0.1UF
C6V4				
C4J1	C4K1	C4K2	421D6009	C,CERAMIC 25V 0.1UF
C4K5	C4M3	C8H1		
C8H2	C8H5	C8J1		
C989			423E2111	C,CERAMIC 500V 10PF
C595	C794		427F4617	C,FILM 50V 0.022UF
C7E6			427F4620	C,FILM 50V 0.039UF
C5A5			427F4621	C,FILM 50V 0.047UF
C5A8	△C5T2	△C5U1	427F4625	C,FILM 50V 0.1UF
C795			427F4629	C,FILM 50V 0.22UF
C5A4			427F4643	C,FILM 50V 220PF 10%
C517	C520		427F4651	C,FILM 50V 1000PF
C515			427F4654	C,FILM 50V 1800PF
C51H			427F4658	C,FILM 50V 3900PF
C744B	C744G	C744R	427F4673	C,FILM 50V 0.068UF

SYMBOL			PARTS NO	DESCRIPTION
C704B	C704G	C704R	42AA2726	C,CERAMIC 50V 0.01UF
C712B	C712G	C712R		
C8G5	C95F	C959		
C964				
C4H2	C402	C406	42AA2744	C,CERAMIC 25V 0.1UF
C482	C5A1	C5A2		
△C5F4	△C5F5	△C5P2		
C50C	C502	C505		
C509	C51A	C51C		
C51F	C513	C519		
C52A	C52C	C521		
C522	C524	C525		
C532	C533	C534		
C535	C537	C539		
C542	C543	C544		
C57E	C57F	C57H		
C57J	C57K	C57M		
C571	C59C	C59E		
C591	C7A1	C7A9		
C7F2	C7F3	C71AB		
C71AG	C71AR	C71E		
C714B	C714G	C714R		
C716	C718	C721B		
C721G	C721R	C724		
C725	C73E	C732B		
C732G	C732R	C733B		
C733G	C733R	C738		
C739	C751	C752		
C79K	C796	C798		
C8A1	C8G3	C8G7		
C8G8	C8G9	C801		
C803	C814	C893		
C905	C95C	C951		
C957	C961	C965		
C966				
C869			42AJ9026	C,CERAMIC 630V 0.1UF
C808	C809		42CA1416	C,CERAMIC 50V 10PF
C723B	C723G	C723R	42CA1426	C,CERAMIC 50V 27PF
C7E8			42CA1428	C,CERAMIC 50V 33PF
C791	C793		42CA1430	C,CERAMIC 50V 39PF
C72AB	C72AG	C72AR	42CA1434	C,CERAMIC 50V 56PF
C953			42CA1436	C,CERAMIC 50V 68PF
C79E			42CA1438	C,CERAMIC 50V 82PF

SYMBOL			PARTS NO	DESCRIPTION
C771			427F4675	C,FILM 50V 0.1UF
△C5R4			42703464	C,FILM 630V 0.012UF
C7A3			428B3511	C,METAL 50V 0.068UF
C705	C707		428B3513	C,METAL FILM 50V 0.1UF
C511			428B3619	C,METAL 50V 0.33UF
C727			428C9002	C,METAL FILM 100V 0.1UF
C7E1			428C9022	C,METAL FILM 250V 0.1UF
△C5R2			428DE025	C,METAL 100V 1.0UF
C5E2			428D0053	C,METAL 100V 0.1UF
C743B	C743G	C743R	428D0093	C,METALFILM 250V 0.1UF
C5A7	C7E4	C729B	428D0097	C,FILM 250V 0.22UF
C729G	C729R			
C611			428D0225	C,METAL 630V 0.022UF
C407			428D4317	C,METAL FILM 100V 0.22UF
C5G2	C5G4		428D5093	C,METAL 250V 0.1UF
C673			428D6009	C,METAL 100V 0.1UF
C672			428D6011	C,METAL 100V 0.15UF
△C575			42816350	C,FILM 250V 0.082UF 5%
△C57A			42816352	C,FILM 250V 0.12UF 5%
△C573			42816354	C,FILM 250V 0.18UF 5%
△C577			42816367	C,FILM 250V 1.5UF 5%
△C576	△C579		42816377	C,FILM 250V 0.13UF 5%
△C574			42816380	C,FILM 250V 0.30UF 5%
△C578			42816385	C,FILM 250V 0.75UF 5%
△C5R3			42826301	C,FILM 800V 1000PF
C6Y2			42839869	C,METAL FILM 400V 1.0UF
C6Y1			42845186	C,METAL FILM 400V 1.2UF
△C6T1	△C6T4		42898002	C,FILM AC250V 0.47UF
△C561			42899184	C,METAL 2.0KV 4700PF
△C5F3			430B6016	C,ELEC 10V 100UF
C581			430B6017	C,ELEC 10V 220UF
C512	C52F	C531	430B6028	C,ELEC 16V 47UF
C7F1	C73A	C731		
C772	C781	C79F		
C8G4				
C7AA	C735	C764	430B6029	C,ELEC 16V 100UF
C766	C797	C802		
C765			430B6030	C,ELEC 16V 220UF
C715			430B6031	C,ELEC 16V 330UF
C483	C501		430B6032	C,ELEC 16V 470UF

SYMBOL			PARTS NO	DESCRIPTION
C4K3	C4K4	C4M1	430B6041	C,ELEC 25V 47UF
C481	C53A	C536		
C538	C57T	C59F		
C597	C8H3	C8H4		
C8K2	C8K4	C952		
C956				
C4H1	C59H	C7E7	430B6042	C,ELEC 25V 100UF
C5AC	C5A9		430B6043	C,ELEC 25V 220UF
C963			430B6061	C,ELEC 50V 1.0UF
C504	C508		430B6062	C,ELEC 50V 2.2UF
C4H3	C4H7	C472	430B6064	C,ELEC 50V 4.7UF
C473	C516	C527		
C545	C7A2	C7A4		
C95E				
C503	C51L	C526	430B6065	C,ELEC 50V 10UF
C596	C7A5	C7E5		
C79H	C799	C865		
C868	C894	C95A		
C986				
C528			430B6067	C,ELEC 50V 33UF
C773			430B6068	C,ELEC 50V 47UF
C6P1			430B6082	C,ELEC 63V 10UF
C86A			430B6098	C,ELEC 100V 10UF
C728	C984		430B6101	C,ELEC 100V 47UF
C5X2			430B6514	C,ELEC 160V 3.3UF
C783			430B6552	C,ELEC 250V 1.0UF
C747			430B6556	C,ELEC 250V 10UF
C7E3	C709	C8A2	430B8144	C,ELEC 16V 47UF
C73F			430B8179	C,ELEC 50V 10UF
⚠C5F1			430B9016	C,ELEC 10V 100UF
C6K1			430B9020	C,ELEC 10V 1000UF
C71FB	C71FG	C71FR	430B9028	C,ELEC 16V 47UF
C713B	C713G	C713R		
C717				
C726			430B9030	C,ELEC 16V 220UF
⚠C5P1			430B9041	C,ELEC 25V 47UF
⚠C5T1			430B9064	C,ELEC 50V 4.7UF
C867			430B9065	C,ELEC 50V 10UF
⚠C2001			430B9066	C,ELEC 50V 22UF
C403			430B9070	C,ELEC 50V 220UF
C401	C405		430B9071	C,ELEC 50V 330UF

SYMBOL			PARTS NO	DESCRIPTION
C896			430B9094	C,ELEC 100V 1.0UF
C5E1			430B9096	C,ELEC 100V 3.3UF
C987			430B9098	C,ELEC 100V 10 UF
C983			430B9101	C,ELEC 100V 47UF
⚠C5X1	C624		430B9516	C,ELEC 160V 10UF
C741B	C741G	C741R	430B9552	C,ELEC 250V 1.0UF
C592	C868		430B9553	C,ELEC 250V 2.2UF
C8G6			430C6531	C,ELEC 16V 10UF
C50F			430C8522	C,ELEC 25V 330UF
C621			430C9502	C,ELEC 35V 220UF
C671			430C9503	C,ELEC 100V 47UF
C6K2			430E2027	C,ELEC 16V 100UF M
⚠C2002			430E2044	C,ELEC 25V 100UF M
C6F3	C6H2		430E2047	C,ELEC 25V 470UF M
C674			430E2102	C,ELEC 100V 1UF M
C8V1			430E3041	C,ELEC 25V 470UF M
C6E2			4302F102	C,ELEC 100V 100UF
C6A2			4302F557	C,ELEC 250V 22UF
C6F1	C6F2	C6G2	4302J047	C,ELEC 25V 2200UF
C6H1				
C6E1	C6E3		4302J104	C,ELEC 100V 330UF
C5A6			4302J556	C,ELEC 250V 10UF
C5G3			4302J558	C,ELEC 250V 33UF
C823			43029071	C,ELEC 50V 330UF
C552			4303H527	C,ELEC 25V 2200UF
C6A1			4303J149	C,ELEC 250V 220UF
⚠C5R1			4309J196	C,ELEC 100V 120UF
C5G1			4309J236	C,ELEC 350V 33UF
C609	C610		43113178	C,ELEC 400V 330UF M
⚠C5F2			433A4013	C,ELEC 10V 47UF
C582			433A4026	C,ELEC 16V 100UF
C958			433A4033	C,ELEC 25V 10UF
C7AG			433A4056	C,ELEC 50V 2.2UF
C711B	C711G	C711R	433A4057	C,ELEC 50V 3.3UF
C706	C708		433A6143	C,ELEC 16V 10UF
C52E			433A6147	C,ELEC 16V 47UF
C701B	C701G	C701R	433A6148	C,ELEC 16V 100UF
C703B	C703G	C703R		
⚠C562			433A7014	C,ELEC 16V 100UF
C5A3			433A7046	C,ELEC 50V 10UF

REPLACEMENT PARTS LIST

The components specified for Model JC-2148UMW (B)

Note: The components identified by ⚠ make are critical for safety.
Replace only with parts Number specified.

SYMBOL			PARTS NO	DESCRIPTION
*** CRT & TUNER ***				
⚠CRT			33021522	CRT M50LJG39X27
*** ICS ***				
IC571			37REH024	MOS M62320FP-D-T2
IC591			370AA067	IC BA10324AF-E2(OP-AMP)
IC5A1	IC522		370AA092	IC BA4558F-E2(OP-AMP)
IC533	IC952		370AA113	IC BA10358F-E2 (OP-AMP)
IC521			370EF021	IC CA0007AM-T
IC531			370EF031	MOS M62393FP-D
IC532			370EF032	MOS M62392FP-D
IC512			370EF033	MOS HD14040BFP-EL
IC541			370E3120	MOS HD74HC74FP-EL
IC511			370E6178	IC BA14741F-E2
IC8G2			370K5002	IC UPC78L05J-T
IC481			37005221	IC UPC78M09AHF
IC471			37005250	IC UPC78M12AHF
IC8G1			37005277	IC PQ05RR13 (REG)
IC401			37006022	IC LA7846N
IC501			37009036	IC UPC1883ACT
IC4K1	IC8H1		37011003	IC LA6510
IC8K1			37011247	IC UPC814C (OP-AMP)
IC742			37011354	IC KIA324P
IC951			37011363	IC M52723SP
IC721			37011380	IC VPS16
IC731			37011391	IC M52755SP
IC711			37011392	IC M52742SP
IC802			37055589	MOS M24C08-BN6
IC6V1			37056615	IC BA10393
IC4H3			37056616	IC BA10358
IC4M1	IC751		37076176	MOS M62393P
IC7A1			37076304	IC M52347SP
IC671			37076357	IC SE080N(LF12)
IC8A1			37076381	MOS 24LCS21A-1/P
IC791			37076402	MOS LSC4501P2
⚠IC621			37076406	IC STR-S6729A(LF953)
IC7F1			37076408	IC SI-3062FA
IC592			37076409	IC BA9757
IC801			37076414	MOS UPD78015FYCW

SYMBOL			PARTS NO	DESCRIPTION
*** TRANSISTORS ***				
Q101	Q102	Q531	35AB0313	TR 2SA1037AK-T146 R
Q546	Q554	Q7E3		
Q732	Q771	Q8A4		
Q8G3				
Q7Y1	Q7Y3	Q7Y5	35AB1592	TR 2SA1434-TB
Q7Y7				
⚠Q5F1			35AB1596	TR 2SA1514K S-T
Q8G1			35BB1274	TR 2SB1197K R-T146
Q682			35CB0012	TR 2SC1623-T1B L6
Q411	Q5E1	⚠Q5F3	35CB1113	TR 2SC2412K-T146 R
Q501	Q545	Q553		
Q7A2	Q7E2	Q7E4		
Q7E5	Q735	Q772		
Q793	Q795	Q8A1		
Q8A3	Q8G2	Q8G5		
Q951				
Q791	Q792	Q796	35CB2385	TR 2SC3735-T1B B34
Q7E1			35CB2393	TR 2SC3757 R-TX
Q7Y2	Q7Y4	Q7Y6	35CB2468	TR 2SC3624-T1B-L18
Q7Y8				
Q891	Q892	Q981	35CB2491	TR 2SC3906K-E2
⚠Q5F2	⚠Q5F4		35EB0212	TR DTA114WKA-T146
Q543	Q544		35EB0229	TR DTC143EKA-T146
Q511	Q512	Q513	35EB0230	TR DTC114EKA-T146
Q542	Q571	Q574		
Q673	Q734	Q797		
Q802				
Q7A1	Q733	Q794	35EB0232	TR DTC144EKA-T146(0*)
Q8A2	Q8G4			
Q103	Q104		35EB0238	TR DTC114YKA-T146
Q721B	Q721G	Q721R	35KB2498	TR 2SK3018-T106
Q722B	Q722G	Q722R		
Q8A5	Q8A6			
Q862	Q864		350A1500	TR 2SA1767-TA
Q983			350A2001	TR 2SA1038S-TP R
Q8V1			350D7216	TR 2SC945-T P
Q6P1	Q621		350E3218	TR 2SC1740S-T R
Q711B	Q711G	Q711R	350H0200	TR 2SC2407A-T
Q893			350H4418	TR,2SC1473-TA R
Q622	Q861	Q863	350J4817	TR 2SC1473A-TA Q

SYMBOL			PARTS NO	DESCRIPTION
Q741B	Q741G	Q741R	350J5205	TR 2SC3415S-TP
Q781				
Q982			350J5241	TR 2SC2389S-TP R
Q987			350J5262	TR 2SC4620 P-TV2
Q5X1	Q5X2		350K4112	TR 2SA916-T L
Q894			350K5218	TR,2SA1018-TA R
Q671			35030000	TR 2SB1626
Q985			35030012	TR 2SB1186A E
Q581			35072612	TR 2SD2396 J
Q5A1			35072720	TR 2SD1889
Q984			35072752	TR 2SD1763A E
Q624	Q625		35092400	TR 2SC3852A
Q623			35095270	TR 2SC2317
⚠Q561			35095411	TR 2SC5453
Q8G6			351G0580	TR DTC114ESA-T
Q5G1			35127790	TR 2SJ449
Q572	Q573		35128003	TR 2SK2098-01MR(F119)
⚠Q5R1			35128009	TR 2SK2645-01MR(F111)
Q555			35128023	TR IRLS530A
MQ571			35135000	TR SLA5046 (FET-ARRAY)
⚠CR601			35595026	TRIAC AC10FSM
Q672			359D7406	TR 2SC1845-T F
*** DIODES ***				
MD701B	MD701G	MD701R	36CB0054	DIODE DA204K-T
MD702B	MD702G	MD702R		
MD712				
D721B	D721G	D721R	36CB0072	DIODE HSM83-TL
D722B	D722G	D722R		
D784				
MD711	MD771	MD8G1	36CB0079	DIODE DAN202K-T146(0*)
⚠D2002	⚠D5P1	D861	36CB0213	DIODE DAN212K-T146
D891	D981	D982		
D984				
D8A1			36CB0233	DIODE RB411D-T146
ZD671			360A0021	DIODE MTZJ3.6B T-72
ZD981			360A0026	DIODE MTZJ4.3A T-72
ZD521			360A0035	DIODE MTZJ5.1B T-72
ZD701	ZD702	ZD703	360A0039	DIODE MTZJ5.6B T-72
ZD704	ZD8A1	ZD8A2		
ZD951				
ZD5E1	ZD5X1		360A0043	DIODE MTZJ6.2B T-72
ZD622			360A0052	DIODE MTZJ7.5C-T72

SYMBOL			PARTS NO	DESCRIPTION
ZD672			360A0054	DIODE MTZJ8.2A T-72
ZD592			360A0055	DIODE MTZJ8.2B T-72
ZD5G1			360A0059	DIODE MTZJ9.1B T-72
ZD721			360A0060	DIODE MTZJ9.1C T-72
ZD412			360A0071	DIODE MTZJ12A
ZD6P1	ZD621		360A0072	DIODE MTZJ12B
ZD552			360A0080	DIODE MTZJ15B-T72
⚠ZD5F1			360A0091	DIODE MTZJ20A
ZD5A1			360A0119	DIODE MTZJ33D-T72
D4H1	D4H2	D411	360K1025	DIODE 1SS133
D5E3	D5G1	D541		
D542	D571	D574		
D593	D6V1	D6V2		
D6V3	D6V4	D7E1		
D7E2	D7E3	D714		
D771	D781	D782		
D791	D792	D8G1		
D8G4	D8K1	D8K2		
D801	D951	D952		
ZD623			360K3116	DIODE RD4.7EB(3)-T4
ZD6G1	ZD6H1		360K3120	DIODE RD24EB(3)-T4
ZD6V1			360K3638	DIODE RD5.6ESB(1)-T4
ZD6V2			360K3664	DIODE RD10ES AB3-T4
D8G5			361K7051	DI 1SR139-400 T3
D603			361K7174	DIODE RU1P V1
D624			361K7505	DIODE ERB44-06V1
D6P1	D6P2	D602	361K7523	DIODE ERA15-04V1
D552	D7K1		361K7562	DIODE EGP10G G23
⚠D5R2			361K7606	DIODE ERB44-08 V1
D5E1	D5E2	D741B	361K7777	DIODE 1SS244-T72
D741G	D741R	D783		
D401	D591	D592	361K7778	DIODE PRI004G,AT52
⚠D2001	⚠D5R3	⚠D5R4	361K7822	DIODE D1NL20,AT52
⚠D5X1				
D6K1	D604	D622	361K7823	DI ERA18-02-V1
D623	D625	D626		
D629	D672	D673		
D6Y3	D627	D628	361K7842	DIODE ERB38-06(V1)

SYMBOL	PARTS NO	DESCRIPTION
D5A1 D5A2 D5G3 D5G4 D512	361K8252	DI RB721Q-40T72
⚠D5R1	36107308	DIODE ERC20M-08
D6Y2	36107701	DIODE RU4AM(LF-K2)
D6F1	36107729	DIODE YG901C2
D551	36107771	DIODE FE5DL-6596
D553	36107775	DIODE RX3Z(LF014-102)
D5G2	36107792	DIODE YG911S3R
D6G2 D6H1	36107832	DI ERC30-01(L3)
D6A1	36107835	DI RU3C(LF-C4)
D6E1 D6Y1	36107841	DIODE FMU-G16S
D671	36107844	DIODE RU3A(LF-C4)
⚠D561	36107846	DIODE FMC-28UA
⚠D601	36108116	DIODE KBU605G-FA1
⚠D562	36108250	DIODE FMQ-G5FS
LED111	36801021	LED SML19416W-LF38
⚠TH6V1	38112071	POSISTOR (PTH451A180M270A
⚠TH6V2	38112072	POSISTOR (PTH451ABG3R0Q14
⚠PC6P1 ⚠PC621	38200354	PHOTOCOUPLER PC123FY2
*** TRANSFORMERS ***		
T551	45804033	TRANS,H.DRAIVE
T981	45950006	D.F.TRANS(W515L)
⚠L562	46204008	COIL,CHOKE 4MH
L5G2	46206023	COIL,CHOKE 4MH
⚠T601	46311121	SWITCHING TRANS
T6Y1	46316102	SWITCHING TRANS
⚠T5R1	47105731	FBT(PCS)
⚠T561	47710025	TRANS,H.OUTPUT
*** VARIABLE RESISTORS ***		
VR581	410G1157	R,VARIABLE B1.0K
⚠VR5T1	415K5163	R,VARIABLE B200K
*** RELAYS & SWITCHES ***		
SW581	65161075	SWITCH SLIDE SSSF022-S09N
⚠SW601	65360060	PUSH SWITCH ESB91631AXL
SW108	65360067	PUSH SWITCH ESB30
SW101 SW102 SW103 SW104 SW105 SW106	65361012	TACT SWITCH

SYMBOL	PARTS NO	DESCRIPTION
*** PWB ASSYS ***		
	847A2A01	SW/HV PWB ASSY
	847A2B01	COMP PWB ASSY
	847A2C02	VIDEO PWB ASSY
	847A2T01	TCO PWB ASSY
	847A3D01	DEF PWB ASSY
*** ELECTRICAL PARTS & MISCELLANEOUS PARTS ***		
HD562	31709503	SHEET,INSULATOR
HQ561	31709507	SHEET,INSULATOR HEAT SINK
SG901B SG901G SG901R SG902	329JK047	ARRESTER
SG901B SG901G SG901R SG902	329J0047	ARRESTER (300V),AT52
CN-FG	32990205	INSULATING CAP TIC-3.5(YE
CNBNC	32990278	BNC-MDSUB PANEL
X801	64098039	X'TAL(10.000MHZ)
⚠F6H1	666J9141	FUSE 25102.5,AT52
⚠F671	666J9242	FUSE 25101.6,AT52
⚠F6T1	66671040	FUSE 250V 5A(215)
SG903 ⚠SG951	667K6007	SPARK GAP 1.5KV
CNCRT	70032275	CRT SOCKET HPS0720-015005
⚠IN6T1	70521069	INLET SK-1019(DELTA)
CORD	70800087	POWER CORD E-2 L1.8 GRY
CABLE	73893255	SIGNAL CABLE MD15P-MD15P
IC4H1	79610568	UNIT,SENSOR TMC-3000NF-02
⚠IC05P1	79644881	HV CONTROL UNIT
⚠IC2001	79645921	HV PROTECTOR UNIT
*** APPEARANCE PARTS ***		
	2E321561	CABINET BACK
	2E321811	CABINET FRONT ASSY
	2E429591	REVOLVING STAND ASSY
	2E787691	NAME PLATE,INSTRUCTION
	2E787721	LABEL(ESCUTCHON)
	25546391	CHASSIS BASE
	25786161	LABEL(TC095)
	25852641	SCREW,SPECIAL(5*25)

SYMBOL	PARTS NO	DESCRIPTION
SW107	65361012	TACT SWITCH
⚠RL571 ⚠RL572 ⚠RL6V1 ⚠RL6V2	65602052 65660047	RELAY DJ1-Q (12V) RELAY RPEF-12
*** COILS & FILTERS ***		
LC76E LC76L LC76R LC767 LC768	390J9028	FILTER ZJSC-R47-391TA
MRC801 MRC802	39040002	RC,NETWORK 10K 1K 0.01UF
⚠L571	60919182	COIL,H.LIN (13T/17T)
L791	610E1725	COIL,FILTER 47UH
L711	610E1729	COIL,FILTER 100UH
L622	610E4001	COIL,FILTER 10UH
L621	610E4006	COIL,FILTER 27UH
L901B L901G L901R	610FF502	COIL,FILTER 0.12UH
⚠L5R2	610F3014	COIL,FILTER 3.3UH
L6E1 L6H1 L6K1	610F3023	COIL,FILTER 33UH
L5G1 L763	610F3025	COIL,FILTER 47UH
⚠L561	610F3035	COIL,FILTER 330UH
L901B L901G L901R	610F6502	COIL,FILTER 0.12UH
LC903 L792 L793	610G0111	INDUCTOR,BEADS(FBR07HA121
L5R1	610G0233	FILTER CHOKE PJ8T-470K
L6E2	610G0322	CHOKECOIL TSL0709-101KR66
L6F1 L6F2	610G0333	CHOKECOIL TSL1112RA-330K2
L6A1 L6H2	610G0335	CHOKECOIL TSL1112RA-680K1
⚠FL6T1 ⚠FL6T2	61062235	COIL,FILTER (LFZ2805V10)
L6Y1	61099161	COIL,CHOKE(SF-T12-75D-01)
⚠DEG	61321111	DEGAUSSING COIL(85T,5H)
EMF	61321309	COIL (85T,63H)
LC761B LC761G LC761R	616J9020	NOISE FILTER TX04200NB
L601 L602	616K5076	COIL,BEADS
LC763 LC764 LC765 LC766	616K6942	NOISE FILTER FILMAC TU20M
LC762B LC762G LC762R	616K6964	NOISE FILTER TX07250NBT
LC76M LC76N	616K6970	NOISE FILTER TY2E101MCT
LC76A LC76G LC76H	616K6971	NOISE FILTER TY2E103MCT
LC76K LC76P LC769 LC901 LC902		

SYMBOL	PARTS NO	DESCRIPTION
*** KNOBS & PUSH BUTTONS ***		
	2X456851	PUSH BUTTON(SW)(B)
*** PRINTED & PACKING MATERIALS ***		
	2E833831	SHEET PROTECTION
	2E835231	FILLER(T).CARTON
	2E835241	FILLER(B).CARTON
	2E835281	PLATE;PULL OUT
	2E835301	CARTON BOX(CN724B)
	24282111	BUSHING,INSULATOR
	24813191	BAG,POLYETHYLENE(150*370)
MANUAL	78133701	MANUAL CN724B USA
*** RESISTORS ***		
J402 J405 J406 J407 J417 J424 J425 J426 J427 J7E2 J7E3 J7E4 R904 R8A2 R8A4 R8A9 R718B R718G R718R R521 R728 R716B R716G R716R R405 R7E1 R893 R864 R896 R74GB R74GG R74GR R742B R742G R742R J401 J403 J408 J409 J410 J411 J413 J414 J415 J416 J418 J419 J420 J421 J422 J423 J429 J7A1 J7A2 J7A3 J7A4 J7A5 J7A6 J7A7 J7A8 J7A9 J7E1	40AAD100	R,CHIP 0.0H 5% 1/2W
	40AAD133	R,CHIP 22H 5% 1/2W
	40AAD146	R,CHIP 75H 5% 1/2W
	40AAD151	R,CHIP 120H 5% 1/2W
	40AAD159	R,CHIP 270H 5% 1/2W
	40AAD163	R,CHIP 390H 5% 1/2W
	40AAD165	R,CHIP 470H 5% 1/2W
	40AAD175	R,CHIP 1.2K 5% 1/2W
	40AAD189	R,CHIP 4.7K 5% 1/2W
	40AAD197	R,CHIP 10K 5% 1/2W
	40AAD199	R,CHIP 12K 5% 1/2W
	40AAD205	R,CHIP 22K 5% 1/2W
	40AAD213	R,CHIP 47K 5% 1/2W
	40AA1000	R,CHIP 0H 5% 1/8W

SYMBOL			PARTS NO	DESCRIPTION
J7E5	J7E6	J7E7	40AA1000	R,CHIP 0H 5% 1/8W
J7E8	J7E9	J7F1		
J7F3	J7F4	J7F5		
J7F6	J7F8	J7F9		
J7G1	J7G2	J7G3		
J7G4	J7G5	J951		
J952				
R581			40AA1165	R,CHIP 470H 5% 1/8W
R81E			40AA1173	R,CHIP 1.0K 5% 1/8W
R411			40AA1185	R,CHIP 3.3K 5% 1/8W
R597			40AA1197	R,CHIP 10K 5% 1/8W
R595			40AA1205	R,CHIP 22K 5% 1/8W
⚠R5F6			40AA1207	R,CHIP 27K 5% 1/8W
R596			40AA1213	R,CHIP 47K 5% 1/8W
R50K			40AA1215	R,CHIP 56K 5% 1/8W
R891			40AA1219	R,CHIP 82K 5% 1/8W
R86E			40AA1233	R,CHIP 330K 5% 1/8W
R573	R574	R575	40AA1239	R,CHIP 560K 5% 1/8W
R576	R577	R578		
R783			40AA1245	R,CHIP 1.0M 5% 1/8W
R7K2			40AA2000	R,CHIP 0.0H 5% 1/4W
R402			40AA2001	R,CHIP 1.0H 5% 1/4W
R989			40AA2009	R,CHIP 4.7H 5% 1/4W
⚠R5P1	⚠R5P2		40AA2133	R,CHIP 22H 5% 1/4E
R57N	R57P		40AA2149	R,CHIP 100H 5% 1/4W
R503	R7EA	R7EE	40AA2165	R,CHIP 470H 5% 1/4W
R7E2	R7E6		40AA2189	R,CHIP 4.7K 5% 1/4W
R7E7			40AA2195	R,CHIP 8.2K 5% 1/4W
R412			40AA2197	R,CHIP 10K 5% 1/4W
R5X2			40AA2199	R,CHIP 12K 5% 1/4W
C50G	R507	R555	40AA3000	R,CHIP 0.0H 5% 1/10W
R7AA	R7F1	R71K		
R715B	R715G	R715R		
R803	R804	R805		
R806	R807	R808		
R809	R815	R831		
R962				
R5G3			40AA3109	R,CHIP 2.2H 5% 1/10W
R558	R582	R812	40AA3125	R,CHIP 10H 5% 1/10W
R813	R814			
R73WB	R73WG	R73WR	40AA3137	R,CHIP 33H 5% 1/10W

SYMBOL			PARTS NO	DESCRIPTION
R80A	R81F	R810	40AA3173	R,CHIP 1.0K 5% 1/10W
R811	R816	R817		
R952	R96A			
R504	R541	R542	40AA3175	R,CHIP 1.2K 5% 1/10W
R70E	R709			
R675	R7F2	R71A	40AA3177	R,CHIP 1.5K 5% 1/10W
R79X	R794			
R5E2	R639	R7E3	40AA3179	R,CHIP 1.8K 5% 1/10W
R7E8	R793	R8AJ		
R54A	R7A8	R739	40AA3181	R,CHIP 2.2K 5% 1/10W
R79A	R79W			
R401			40AA3182	R,CHIP 2.4K 5% 1/10W
R8G6	R801	R802	40AA3183	R,CHIP 2.7K 5% 1/10W
R862				
R50A	R7YF	R7Y3	40AA3185	R,CHIP 3.3K 5% 1/10W
R7Y6	R7Y9	R748B		
R748G	R748R	R8G2		
R52T	R696	R79F	40AA3187	R,CHIP 3.9K 5% 1/10W
R536	R672	R79L	40AA3189	R,CHIP 4.7K 5% 1/10W
R8GH				
R7AH	R7AK		40AA3190	R,CHIP 5.1K 5% 1/10W
R5AC	R5A7	R59K	40AA3191	R,CHIP 5.6K 5% 1/10W
R791	R892			
R772			40AA3193	R,CHIP 6.8K 5% 1/10W
R5G2	R775		40AA3195	R,CHIP 8.2K 5% 1/10W
R4H2	R4H6	R5A5	40AA3197	R,CHIP 10K 5% 1/10W
R5A6	⚠R5F5	⚠R5F8		
R51L	R514	R537		
R545	R547	R59L		
R603	R633	R747B		
R747G	R747R	R771		
R79E	R79H	R79M		
R79T	R79U	R799		
R8A5	R8A6	R8A7		
R8GA	R8G1	R8G3		
R8G7	R951	R955		
R956				
R861			40AA3198	R,CHIP 11K 5% 1/10W
R59F			40AA3199	R,CHIP 12K 5% 1/10W
R5A3			40AA3201	R,CHIP 15K 5% 1/10W
R8G8			40AA3203	R,CHIP 18K 5% 1/10W
⚠R5F7	R79N		40AA3205	R,CHIP 22K 5% 1/10W

SYMBOL			PARTS NO	DESCRIPTION
R73XB	R73XG	R73XR	40AA3137	R,CHIP 33H 5% 1/10W
R798				
R549			40AA3141	R,CHIP 47H 5% 1/10W
R70A	R70F		40AA3143	R,CHIP 56H 5% 1/10W
R736R			40AA3145	R,CHIP 68H 5% 1/10W
R736G			40AA3147	R,CHIP 82H 5% 1/10W
R502	R53A	R53C	40AA3149	R,CHIP 100H 5% 1/10W
R53E	R53F	R538		
R539	R556	R57A		
R57C	R57E	R57F		
R57J	R579	R71F		
R71G	R712	R721B		
R721G	R721R	R726B		
R726G	R726R	R727B		
R727G	R727R	R731		
R732	R733	R734		
R736B	R752	R753		
R795	R796			
R717B	R717G	R717R	40AA3151	R,CHIP 120H 5% 1/10W
R719B	R719G	R719R		
R509			40AA3153	R,CHIP 150H 5% 1/10W
R71H			40AA3155	R,CHIP 180H 5% 1/10W
R745B	R745G	R745R	40AA3157	R,CHIP 220H 5% 1/10W
R7YE	R7Y2	R7Y5	40AA3161	R,CHIP 330H 5% 1/10W
R7Y8				
R50E	R781		40AA3167	R,CHIP 560H 5% 1/10W
R543	R544	R621	40AA3169	R,CHIP 680H 5% 1/10W
R640	R673	R738		
R774				
R641	R901B	R901G	40AA3171	R,CHIP 820H 5% 1/10W
R901R				
R5E4	R5E5	R50C	40AA3173	R,CHIP 1.0K 5% 1/10W
R505	R511	R516		
R52H	R52J	R52K		
R52L	R52M	R52N		
R52R	R531	R532		
R546	R7AL	R7AM		
R7A1	R7A7	R7E9		
R71E	R72E	R72F		
R751	R773	R79G		
R797B	R797G	R797R		
R8AE	R8AF	R8G4		

SYMBOL			PARTS NO	DESCRIPTION
R548	R8A1	R819	40AA3207	R,CHIP 27K 5% 1/10W
R598	R782	R8AA	40AA3209	R,CHIP 33K 5% 1/10W
R8AH	R954			
R7A9			40AA3212	R,CHIP 43K 5% 1/10W
R678	R73A	R73Y	40AA3213	R,CHIP 47K 5% 1/10W
R79K	R79P	R79R		
R8A3	R8A8			
R953			40AA3217	R,CHIP 68K 5% 1/10W
R697			40AA3219	R,CHIP 82K 5% 1/10W
R4H1	R4H5	⚠R5F4	40AA3221	R,CHIP 100K 5% 1/10W
R5X3	R59J	R642		
R784			40AA3231	R,CHIP 270K 5% 1/10W
R7YA	R7Y1	R7Y4	40AA3233	R,CHIP 330K 5% 1/10W
R7Y7	R787	R990		
⚠R5F3	R8GF		40AA3235	R,CHIP 390K 5% 1/10W
R5A8			40AA3239	R,CHIP 560K 5% 1/10W
R785	R786		40AA3242	R,CHIP 750K 5% 1/10W
R8G5			40AA3243	R,CHIP 820K 5% 1/10W
R792			40AA3245	R,CHIP 1.0M 5% 1/10W
R5G1			40AA5141	R,CHIP 47H 5% 1/4W
R866	R993		40AA5193	R,CHIP 6.8K 5% 1/4W
R868			40AA5196	R,CHIP 9.1K 5% 1/4W
R898			40AA5207	R,CHIP 27K 5% 1/4W
R984			40AB1171	R,CHIP 820H 1% 1/8W
R506	R534		40AB1179	R,CHIP 1.8K 1% 1/8W
⚠R5U3			40AB1224	R,CHIP 130K 1% 1/8W
R865	R894		40AB2187	R,CHIP 3.9K 1% 1/4W
R724B	R724G	R724R	40AB3145	R,CHIP 68H 1% 1/10W
R624			40AB3149	R,CHIP 100H 1% 1/10W
R701B	R701G	R701R	40AB3153	R,CHIP 150H 1% 1/10W
R702B	R702G	R702R		
R703B	R703G	R703R		
R704B	R704G	R704R		
R101	R725B	R725G	40AB3155	R,CHIP 180H 1% 1/10W
R725R				
R535			40AB3163	R,CHIP 390H 1% 1/10W
R501	R723B	R723G	40AB3167	R,CHIP 560H 1% 1/10W
R723R				
R992			40AB3169	R,CHIP 680H 1% 1/10W
R104	R105		40AB3170	R,CHIP 750H 1% 1/10W

SYMBOL			PARTS NO	DESCRIPTION
R102	R103		40AB3173	R,CHIP 1.0K 1% 1/10W
R4H8	R508		40AB3174	R,CHIP 1.1K 1% 1/10W
R524			40AB3176	R,CHIP 1.3K 1% 1/10W
R50G	R527	R714	40AB3177	R,CHIP 1.5K 1% 1/10W
R50F			40AB3179	R,CHIP 1.8K 1% 1/10W
R4H7	R7A3		40AB3181	R,CHIP 2.2K 1% 1/10W
⚠R5U1	R518	R73F	40AB3183	R,CHIP 2.7K 1% 1/10W
R404			40AB3184	R,CHIP 3.0K 1% 1/10W
R59G	R722B	R722G	40AB3185	R,CHIP 3.3K 1% 1/10W
R722R				
R7A2			40AB3187	R,CHIP 3.9K 1% 1/10W
R526			40AB3189	R,CHIP 4.7K 1% 1/10W
R73E			40AB3191	R,CHIP 5.6K 1% 1/10W
R51A	R529	R967	40AB3193	R,CHIP 6.8K 1% 1/10W
R50H			40AB3196	R,CHIP 9.1K 1% 1/10W
R51C	R51F	R51T	40AB3197	R,CHIP 10K 1% 1/10W
R52C	R52E	R52F		
R52G	R52W	R59C		
R593	R86F	R867		
R957	R958	R959	40AB3198	R,CHIP 11K 1% 1/10W
R59M	R594	R713	40AB3199	R,CHIP 12K 1% 1/10W
R403	R51R	R517	40AB3200	R,CHIP 13K 1% 1/10W
R5X5			40AB3201	R,CHIP 15K 1% 1/10W
R522			40AB3202	R,CHIP 16K 1% 1/10W
R515	R591		40AB3203	R,CHIP 18K 1% 1/10W
R73G	R74AB	R74AG	40AB3205	R,CHIP 22K 1% 1/10W
R74AR				
R59E			40AB3207	R,CHIP 27K 1% 1/10W
R971	R972	R973	40AB3209	R,CHIP 33K 1% 1/10W
R974				
R74EB	R74EG	R74ER	40AB3211	R,CHIP 39K 1% 1/10W
R51E	R51G		40AB3212	R,CHIP 43K 1% 1/10W
R52A	R528	R963	40AB3213	R,CHIP 47K 1% 1/10W
R7AG			40AB3214	R,CHIP 51K 1% 1/10W
R525	R629	R630	40AB3217	R,CHIP 68K 1% 1/10W
⚠R5U2	R519	R749B	40AB3219	R,CHIP 82K 1% 1/10W
R749G	R749R			
R59A	R746B	R746G	40AB3221	R,CHIP 100K 1% 1/10W
R746R				
R74FB	R74FG	R74FR	40AB3222	R,CHIP 110K 1% 1/10W

SYMBOL			PARTS NO	DESCRIPTION
R6V9	R6W1		401KE689	R,CARBON 4.7K 5% 1/6W
R6V5			401KE693	R,CARBON 6.8K 5% 1/6W
R8K5			401KE695	R,CARBON 8.2K 5% 1/6W
R6V3			401KE697	R,CARBON 10K 5% 1/6W
R6P2			401KE713	R,CARBON 47K 5% 1/6W
R6V6	R6V8		401KE721	R,CARBON 100K 5% 1/6W
R741B	R741G	R741R	401KE737	R,CARBON 470K 5% 1/6W
R8K1			401KE741	R,CARBON 680K 5% 1/6W
R6V7			401KE745	R,CARBON 1.0M 5% 1/6W
R4J4	R4K9		401K5609	R,CARBON 2.2H 5% 1/6W
R8J4			401K5625	R,CARBON 10H 5% 1/6W
R8H4			401K5629	R,CARBON 15H 5% 1/6W
R4M2	R4M3		401K5649	R,CARBON 100H 5% 1/6W
R6W3			401K5663	R,CARBON 390H 5% 1/6W
R6K2	R6V4		401K5669	R,CARBON 680H 5% 1/6W
R4K6	R4M1	R6W0	401K5673	R,CARBON 1.0K 5% 1/6W
R676			401K5681	R,CARBON 2.2K 5% 1/6W
R6V9	R6W1		401K5689	R,CARBON 4.7K 5% 1/6W
R6V5			401K5693	R,CARBON 6.8K 5% 1/6W
R8K5			401K5695	R,CARBON 8.2K 5% 1/6W
R6V3			401K5697	R,CARBON 10K 5% 1/6W
R6P2			401K5713	R,CARBON 47K 5% 1/6W
R6V6	R6V8		401K5721	R,CARBON 100K 5% 1/6W
R741B	R741G	R741R	401K5737	R,CARBON 470K 5% 1/6W
R8K1			401K5741	R,CARBON 680K 5% 1/6W
R6V7			401K5745	R,CARBON 1.0M 5% 1/6W
⚠R636			40178143	R,CARBON 56H 5% 1/2W
⚠R5R1	⚠R5R2		40224137	R,WIRE 33H 5% 5W
⚠R602	⚠R606		40299104	R,WIRE 10H 5% 5W
R605			40299181	R,WIRE 56K 5% 5W
R622			40371103	R,METAL 1.2H 5% 1W
R7F5			40371109	R,METAL 2.2H 5% 1W
R8GE			40371113	R,METAL 3.3H 5% 1W
R561			40371125	R,METAL 10H 5% 1W
R583			40371129	R,METAL 15H 5% 1W
R584			40371131	R,METAL 18H 5% 1W
R559			40371133	R,METAL 22H 5% 1W
R8GG			40371147	R,METAL 82H 5% 1W
R5E3			40371187	R,METAL 3.9K 5% 1W

SYMBOL			PARTS NO	DESCRIPTION
R592			40AB3223	R,CHIP 120K 1% 1/10W
R5X4			40AB3226	R,CHIP 160K 1% 1/10W
R744B	R744G	R744R	40AB3227	R,CHIP 180K 1% 1/10W
R5A4			40AB3229	R,CHIP 220K 1% 1/10W
R599	R743B	R743G	40AB3233	R,CHIP 330K 1% 1/10W
R743R				
R523			40AB5223	R,CHIP 120K 1% 1/2W
R4J6	R4K3	R8H6	401CF609	R,CARBON 2.2H 5% 1/4W
R8J6				
R902B	R902G	R902R	401CF629	R,CARBON 15H 5% 1/4W
R6V1			401CF631	R,CARBON 18H 5% 1/4W
R903			401CF649	R,CARBON 100H 5% 1/4W
R6G2			401CF671	R,CARBON 820H 5% 1/4W
R905			401CF689	R,CARBON 4.7K 5% 1/4W
R631	R632		401CF731	R,CARBON 270K 5% 1/4W
R4J6	R4K3	R8H6	401C6609	R,CARBON 2.2H 5% 1/4W
R8J6				
R902B	R902G	R902R	401C6629	R,CARBON 15H 5% 1/4W
R6V1			401C6631	R,CARBON 18H 5% 1/4W
R903			401C6649	R,CARBON 100H 5% 1/4W
R6G2			401C6671	R,CARBON 820H 5% 1/4W
R905			401C6689	R,CARBON 4.7K 5% 1/4W
R631	R632		401C6731	R,CARBON 270K 5% 1/4W
⚠R6V2			401G6109	R,CARBON 2.2H 5% 1/4W
⚠R985	⚠R986		401G6141	R,CARBON 47H 5% 1/4W
⚠R5F2			401G6191	R,CARBON 5.6K 5% 1/4W
R4K4			401HE641	R,CARBON 47H 5% 1/2W
R4J5			401H5625	R,CARBON 10H 5% 1/2W
R4K4			401H5641	R,CARBON 47H 5% 1/2W
⚠R995			401H5677	R,CARBON 1.5K 5% 1/2W
R6P1			401H5727	R,CARBON 180K 5% 1/2W
⚠R6T1			401H5743	R,CARBON 820K 5% 1/2W
R4J4	R4K9		401KE609	R,CARBON 2.2H 5% 1/6W
R8J4			401KE625	R,CARBON 10H 5% 1/6W
R8H4			401KE629	R,CARBON 15H 5% 1/6W
R4M2	R4M3		401KE649	R,CARBON 100H 5% 1/6W
R6W3			401KE663	R,CARBON 390H 5% 1/6W
R6K2	R6V4		401KE669	R,CARBON 680H 5% 1/6W
R4K6	R4M1	R6W0	401KE673	R,CARBON 1.0K 5% 1/6W
R676			401KE681	R,CARBON 2.2K 5% 1/6W

SYMBOL			PARTS NO	DESCRIPTION
R677			40371199	R,METAL 12K 5% 1W
R86A	R869		40371205	R,METAL 22K 5% 1W
R863			40371207	R,METAL 27K 5% 1W
R5AE	R6A1	R6A2	40371221	R,METAL 100K 5% 1W
⚠R5R3			40371329	R,METAL 0.22H 5% 1W
R623			40371337	R,METAL 0.47H 5% 1W
⚠R5F1			40371339	R,METAL 0.56H 5% 1W
⚠R562			40372131	R,METAL 18H 5% 2W
R604			40372143	R,METAL 56H 5% 2W
R8J5			40372147	R,METAL 82H 5% 2W
R8H5			40372151	R,METAL 120H 5% 2W
R7E4			40372169	R,METAL 680H 5% 2W
R6E1			40372199	R,METAL 12K 5% 2W
R638			40372201	R,METAL 15K 5% 2W
R634			40372213	R,METAL 47K 5% 2W
R991			40372215	R,METAL 56K 5% 2W
R635			40372217	R,METAL 68K 5% 2W
R671			40373109	R,METAL 2.2H 5% 3W
R674			40373187	R,METAL 3.9K 5% 3W
⚠R571			40383028	R,METAL 180H 5% 3W
R55A			40399092	R,METAL 1.2H 5% 5W
R4M5			404CA679	R,METAL 1.8K 1% 1/6W
R626			404CA689	R,METAL 4.7K 1% 1/6W
R8K2			404CA697	R,METAL 10K 1% 1/6W
R4M4			404CA698	R,METAL 11K 1% 1/6W
R4J2	R4K2	R8H2	404CA704	R,METAL 20K 1% 1/6W
R8J2				
R4J1	R4K1	R8H1	404CA714	R,METAL 51K 1% 1/6W
R8J1				
R6W2			404CA715	R,METAL 56K 1% 1/6W
R8K4			404CA716	R,METAL 62K 1% 1/6W
⚠R5T2			404CA718	R,METAL 75K 1% 1/6W
⚠R5T1			404CA731	R,METAL 270K 1% 1/6W
R627	R628	R694	404CA745	R,METAL 1.0M 1% 1/6W
R695				
R8J3			404C1626	R,METAL 11H 1% 1/6W
R8H3			404C1631	R,METAL 18H 1% 1/6W
R4M5			404C1679	R,METAL 1.8K 1% 1/6W
R86G			404C1685	R,METAL 3.3K 1% 1/6W
R626			404C1689	R,METAL 4.7K 1% 1/6W

SYMBOL			PARTS NO	DESCRIPTION
R8K2			404C1697	R,METAL 10K 1% 1/6W
R4M4			404C1698	R,METAL 11K 1% 1/6W
R4J2	R4K2	R8H2	404C1704	R,METAL 20K 1% 1/6W
R8J2				
R4J1	R4K1	R8H1	404C1714	R,METAL 51K 1% 1/6W
R8J1				
R6W2			404C1715	R,METAL 56K 1% 1/6W
R8K4			404C1716	R,METAL 62K 1% 1/6W
R5T2			404C1718	R,METAL 75K 1% 1/6W
R5T1			404C1731	R,METAL 270K 1% 1/6W
R627	R628	R694	404C1745	R,METAL 1.0M 1% 1/6W
R695				
△R6K1			404E1329	R,METAL 0.22H 5% 1/4W
△R5A9			404J9509	R,METAL 470H 1% 1/4W
△R5E1	△R557		404J9510	R,METAL 2.2H 5% 1/4W
R4K5			404K2628	R,METAL 13H 1% 1/4W
R4J3			404K3623	C,METAL 8.2H 1% 1/2W
△R2001			404K5109	R,METAL 2.2H 5% 1/4W
△R868			404K5117	R,METAL 4.7H 5% 1/4W
△R4M8			404K5123	R,METAL 8.2H 5% 1/4W
△R4H9	△R5A1	△R5X1	404K5125	R,METAL 10H 5% 1/4W
△R50J	△R51P	△R7E5		
△R994				
△R5P3			404K5149	R,METAL 100H 5% 1/4W
R406			40499440	R,METAL 1.0H 1% 1W
R983			40499449	R,METAL 10K 2% 1W
R625			40499462	R,METAL 0.12H 5% 3W
△R6G1			40499507	R,METAL 0.22H 5% 1/2W
△R6F1			40499508	R,METAL 0.1H 5% 1/2W
*** CAPACITORS ***				
C80A	C80E	C80F	42AA1509	C,CHIP CERAMIC 50V 1000PF
C79G			42AA1515	C,CHIP CERAMIC 50V 3300PF
C742B	C742G	C742R	42AA1521	C,CHIP CERAMIC 50V 0.01UF
C862				
C748			42AA1538	C,CERAMIC 25V 0.1UF
C607			42AA2721	C,CERAMIC 50V 0.1UF
C471	C523	C529	42AA2726	C,CERAMIC 50V 0.01UF
C702B	C702G	C702R		

SYMBOL			PARTS NO	DESCRIPTION
C5E3	C7AE	C954	42CA1440	C,CERAMIC 50V 100PF
C955				
C79A			42CA1444	C,CERAMIC 50V 150PF
C7A8	C7E2	C722B	42CA1448	C,CERAMIC 50V 220PF
C722G	C722R			
C598			42CA1452	C,CHIP 50V 330PF
C8G1			42CA1454	C,CERAMIC 50V 390UF
C625			42CA1456	C,CERAMIC 50V 470PF
C892			42CA1464	C,CERAMIC 50V 1000PF
C891			42CE0115	C,CERAMIC 100V 100PF
△C57C			420C9066	C,CERAMIC 500V 1800PF
C902			420C9551	C,CERAMIC 500V 100PF
C901			420C9557	C,CERAMIC 500V 330PF
C553	C985	C988	420C9563	C,CERAMIC 500V 1000PF
C593			420C9567	C,CERAMIC 500V 2200PF
C554			420C9571	C,CERAMIC 500V 4700PF
C904			420D0019	C,CERAMIC 2KV 1000PF
△C6T2	△C6T3		420EJ013	C,CERAMIC 400V 1000PF
C622			420J8065	C,CERAMIC 1K 1200PF 10%
C864			420J9118	C,CERAMIC 500V 0.01UF
C903			4204K108	C,CERAMIC 2KV 0.01UF
△C608			42060330	C,CERAMIC 400V 2200PF
C8K1	C8K3		421A0425	C,CERAMIC 50V 0.01UF
C506			421C3335	C,CERAMIC 50V 470PF
C4M2	C6V2	C6V3	421C3479	C,CERAMIC 50V 0.1UF
C6V4				
C4J1	C4K1	C4K2	421D6009	C,CERAMIC 25V 0.1UF
C4K5	C4M3	C8H1		
C8H2	C8H5	C8J1		
C989			423E2111	C,CERAMIC 500V 10PF
C595	C794		427F4617	C,FILM 50V 0.022UF
C7E6			427F4620	C,FILM 50V 0.039UF
C5A5			427F4621	C,FILM 50V 0.047UF
C5A8	△C5T2	△C5U1	427F4625	C,FILM 50V 0.1UF
C795			427F4629	C,FILM 50V 0.22UF
C5A4			427F4643	C,FILM 50V 220PF 10%
C517	C520		427F4651	C,FILM 50V 1000PF
C515			427F4654	C,FILM 50V 1800PF
C51H			427F4658	C,FILM 50V 3900PF
C744B	C744G	C744R	427F4673	C,FILM 50V 0.068UF

SYMBOL			PARTS NO	DESCRIPTION
C704B	C704G	C704R	42AA2726	C,CERAMIC 50V 0.01UF
C712B	C712G	C712R		
C8G5	C95F	C959		
C964				
C4H2	C402	C406	42AA2744	C,CERAMIC 25V 0.1UF
C482	C5A1	C5A2		
△C5F4	△C5F5	△C5P2		
C5DC	C502	C505		
C509	C51A	C51C		
C51F	C513	C519		
C52A	C52C	C521		
C522	C524	C525		
C532	C533	C534		
C535	C537	C539		
C542	C543	C544		
C57E	C57F	C57H		
C57J	C57K	C57M		
C571	C59C	C59E		
C591	C7A1	C7A9		
C7F2	C7F3	C71AB		
C71AG	C71AR	C71E		
C714B	C714G	C714R		
C716	C718	C721B		
C721G	C721R	C724		
C725	C73E	C732B		
C732G	C732R	C733B		
C733G	C733R	C738		
C739	C751	C752		
C79K	C796	C798		
C8A1	C8G3	C8G7		
C8G8	C8G9	C801		
C803	C814	C893		
C905	C95C	C951		
C957	C961	C965		
C966				
C869			42AJ9026	C,CERAMIC 630V 0.1UF
C808	C809		42CA1416	C,CERAMIC 50V 10PF
C723B	C723G	C723R	42CA1426	C,CERAMIC 50V 27PF
C7E8			42CA1428	C,CERAMIC 50V 33PF
C791	C793		42CA1430	C,CERAMIC 50V 39PF
C72AB	C72AG	C72AR	42CA1434	C,CERAMIC 50V 56PF
C953			42CA1436	C,CERAMIC 50V 68PF
C79E			42CA1438	C,CERAMIC 50V 82PF

SYMBOL			PARTS NO	DESCRIPTION
C771			427F4675	C,FILM 50V 0.1UF
△C5R4			427D3464	C,FILM 630V 0.012UF
C7A3			428B3511	C,METAL 50V 0.068UF
C705	C707		428B3513	C,METAL FILM 50V 0.1UF
C511			428B3619	C,METAL 50V 0.33UF
C727			428C9002	C,METAL FILM 100V 0.1UF
C7E1			428C9022	C,METAL FILM 250V 0.1UF
△C5R2			428DE025	C,METAL 100V 1.0UF
C5E2			428D0053	C,METAL 100V 0.1UF
C743B	C743G	C743R	428D0093	C,METALFILM 250V 0.1UF
C5A7	C7E4	C729B	428D0097	C,FILM 250V 0.22UF
C729G	C729R			
C611			428D0225	C,METAL 630V 0.022UF
C407			428D4317	C,METAL FILM 100V 0.22UF
C5G2	C5G4		428D5093	C,METAL 250V 0.1UF
C673			428D6009	C,METAL 100V 0.1UF
C672			428D6011	C,METAL 100V 0.15UF
△C57A			42816352	C,FILM 250V 0.12UF 5%
△C576			42816353	C,FILM 250V 0.15UF 5%
△C573			42816354	C,FILM 250V 0.18UF 5%
△C574			42816358	C,FILM 250V 0.33UF 5%
△C577			42816367	C,FILM 250V 1.5UF 5%
△C575			42816375	C,FILM 250V 0.091UF 5%
△C579			42816377	C,FILM 250V 0.13UF 5%
△C578			42816385	C,FILM 250V 0.75UF 5%
△C5R3			42826301	C,FILM 800V 1000PF
C6Y2			42839869	C,METAL FILM 400V 1.0UF
C6Y1			42845186	C,METAL FILM 400V 1.2UF
△C6T1	△C6T4		42898002	C,FILM AC250V 0.47UF
△C561			42899184	C,METAL 2.0KV 470PF
△C5F3			430B6016	C,ELEC 10V 100UF
C581			430B6017	C,ELEC 10V 220UF
C512	C52F	C531	430B6028	C,ELEC 16V 47UF
C7F1	C73A	C731		
C772	C781	C79F		
C8G4				
C7AA	C735	C764	430B6029	C,ELEC 16V 100UF
C766	C797	C802		
C765			430B6030	C,ELEC 16V 220UF
C715			430B6031	C,ELEC 16V 330UF

SYMBOL			PARTS NO	DESCRIPTION
C483	C5D1		430B6032	C,ELEC 16V 470UF
C4K3	C4K4	C4M1	430B6041	C,ELEC 25V 47UF
C481	C53A	C536		
C538	C57T	C59F		
C597	C8H3	C8H4		
C8K2	C8K4	C952		
C956				
C4H1	C59H	C7E7	430B6042	C,ELEC 25V 100UF
C5AC	C5A9		430B6043	C,ELEC 25V 220UF
C963			430B6061	C,ELEC 50V 1.0UF
C504	C508		430B6062	C,ELEC 50V 2.2UF
C4H3	C4H7	C472	430B6064	C,ELEC 50V 4.7UF
C473	C516	C527		
C545	C7A2	C7A4		
C95E				
C503	C51L	C526	430B6065	C,ELEC 50V 10UF
C596	C7A5	C7E5		
C79H	C799	C865		
C866	C894	C95A		
C986				
C528			430B6067	C,ELEC 50V 33UF
C773			430B6068	C,ELEC 50V 47UF
C6P1			430B6082	C,ELEC 63V 10UF
C86A			430B6098	C,ELEC 100V 10UF
C728	C984		430B6101	C,ELEC 100V 47UF
C5X2			430B6514	C,ELEC 160V 3.3UF
C783			430B6552	C,ELEC 250V 1.0UF
C747			430B6556	C,ELEC 250V 10UF
C7E3	C709	C8A2	430B8144	C,ELEC 16V 47UF
C73F			430B8179	C,ELEC 50V 10UF
⚠C5F1			430B9016	C,ELEC 10V 100UF
C6K1			430B9020	C,ELEC 10V 1000UF
C71FB	C71FG	C71FR	430B9028	C,ELEC 16V 47UF
C713B	C713G	C713R		
C717				
C726			430B9030	C,ELEC 16V 220UF
⚠C5P1			430B9041	C,ELEC 25V 47UF
⚠C5T1			430B9064	C,ELEC 50V 4.7UF
C867			430B9065	C,ELEC 50V 10UF
⚠C2001			430B9066	C,ELEC 50V 22UF
C403			430B9070	C,ELEC 50V 220UF

SYMBOL	PARTS NO	DESCRIPTION
C5A3	433A7046	C,ELEC 50V 10UF

SYMBOL			PARTS NO	DESCRIPTION
C401	C405		430B9071	C,ELEC 50V 330UF
C896			430B9094	C,ELEC 100V 1.0UF
C5E1			430B9096	C,ELEC 100V 3.3UF
C987			430B9098	C,ELEC 100V 10 UF
C983			430B9101	C,ELEC 100V 47UF
⚠C5X1	C624		430B9516	C,ELEC 160V 10UF
C741B	C741G	C741R	430B9552	C,ELEC 250V 1.0UF
C592	C868		430B9553	C,ELEC 250V 2.2UF
C8G6			430C6531	C,ELEC 16V 10UF
C50F			430C8522	C,ELEC 25V 330UF
C621			430C9502	C,ELEC 35V 220UF
C671			430C9503	C,ELEC 100V 47UF
C6K2			430E2027	C,ELEC 16V 100UF M
⚠C2002			430E2044	C,ELEC 25V 100UF M
C6F3	C6H2		430E2047	C,ELEC 25V 470UF M
C674			430E2102	C,ELEC 100V 1UF M
C6V1			430E3041	C,ELEC 25V 470UF M
C6E2			4302F102	C,ELEC 100V 100UF
C6A2			4302F557	C,ELEC 250V 22UF
C6F1	C6F2	C6G2	4302J047	C,ELEC 25V 2200UF
C6H1				
C6E1	C6E3		4302J104	C,ELEC 100V 330UF
C5A6			4302J556	C,ELEC 250V 10UF
C5G3			4302J558	C,ELEC 250V 33UF
C623			43029071	C,ELEC 50V 330UF
C552			4303H527	C,ELEC 25V 2200UF
C6A1			4303J149	C,ELEC 250V 22UF
⚠C5R1			4309J196	C,ELEC 100V 120UF
C5G1			4309J236	C,ELEC 350V 33UF
C609	C610		43113178	C,ELEC 400V 330UF M
⚠C5F2			433A4013	C,ELEC 10V 47UF
C582			433A4026	C,ELEC 16V 100UF
C958			433A4033	C,ELEC 25V 10UF
C7AG			433A4056	C,ELEC 50V 2.2UF
C711B	C711G	C711R	433A4057	C,ELEC 50V 3.3UF
C708	C708		433A6143	C,ELEC 16V 10UF
C52E			433A6147	C,ELEC 16V 47UF
C701B	C701G	C701R	433A6148	C,ELEC 16V 100UF
C703B	C703G	C703R		
⚠C562			433A7014	C,ELEC 16V 100UF

REPLACEMENT PARTS LIST

The components specified for Model JC-2148UMW (R)

Note: The components identified by⚠ make are critical for safety.
Replace only with parts Number specified.

SYMBOL	PARTS NO	DESCRIPTION
*** CRT & TUNER ***		
⚠CRT	33021513	CRT M50LJG39X27R
*** ICS ***		
IC571	37REH024	MOS M62320FP-D-T2
IC591	370AA067	IC BA10324AF-E2(OP-AMP)
IC5A1 IC522	370AA092	IC BA4558F-E2(OP-AMP)
IC533 IC952	370AA113	IC BA10358F-E2 (OP-AMP)
IC521	370EF021	IC CA0007AM-T
IC531	370EF031	MOS M62393FP-D
IC532	370EF032	MOS M62392FP-D
IC512	370EF033	MOS HD14040BFP-EL
IC541	370E3120	MOS HD74HC74FP-EL
IC511	370E6178	IC BA14741F-E2
IC8G2	370K5002	IC UPC78L05J-T
IC481	37005221	IC UPC78M09AHF
IC471	37005250	IC UPC78M12AHF
IC8G1	37005277	IC PQ05RR13 (REG)
IC401	37006022	IC LA7846N
IC501	37009036	IC UPC1883ACT
IC4K1 IC8H1	37011003	IC LA6510
IC8K1	37011247	IC UPC814C (OP-AMP)
IC742	37011354	IC KIA324P
IC951	37011363	IC M52723SP
IC721	37011380	IC VPS16
IC731	37011391	IC M52755SP
IC711	37011392	IC M52742SP
IC802	37055589	MOS M24C08-BN6
IC6V1	37056615	IC BA10393
IC4H3	37056616	IC BA10358
IC4M1 IC751	37076178	MOS M62393P
IC7A1	37076304	IC M52347SP
IC671	37076357	IC SE080N(LF12)
IC8A1	37076381	MOS 24LCS21A-I/P
IC791	37076402	MOS LSC4501P2
⚠IC621	37076406	IC STR-S6729A(LF953)
ICTF1	37076408	IC SI-3062FA
IC592	37076409	IC BA9757
IC801	37076414	MOS UPD78015FYCW

SYMBOL	PARTS NO	DESCRIPTION
Q741B Q741G Q741R	350J5205	TR 2SC3415S-TP
Q781		
Q982	350J5241	TR 2SC2389S-TP R
Q987	350J5262	TR 2SC4620 P-TV2
Q5X1 Q5X2	350K4112	TR 2SA916-T L
Q894	350K5218	TR,2SA1018-TA R
Q671	35030000	TR 2SB1626
Q985	35030012	TR 2SB1186A E
Q581	35072612	TR 2SD2396 J
Q5A1	35072720	TR 2SD1889
Q984	35072752	TR 2SD1763A E
Q624 Q625	35092400	TR 2SC3852A
Q623	35095270	TR 2SC2317
⚠Q561	35095411	TR 2SC5453
Q8G6	35160580	TR DTC114ESA-T
Q5G1	35127790	TR 2SJ449
Q572 Q573	35128003	TR 2SK2098-01MR(F119)
⚠Q5R1	35128009	TR 2SK2645-01MR(F111)
Q555	35128023	TR IRLS530A
MQ571	35135000	TR SLA5046 (FET-ARRAY)
⚠CR601	35595026	TRIAC AC10FSM
Q672	359D7406	TR 2SC1845-T F
*** DIODES ***		
MD701B MD701G MD701R MD702B MD702G MD702R MD712	36CB0054	DIODE DA204K-T
D721B D721G D721R D722B D722G D722R D784	36CB0072	DIODE HSM83-TL
MD711 MD771 MD8G1	36CB0079	DIODE DAN202K-T146(O*)
⚠D2002 ⚠D5P1 D861	36CB0213	DIODE DAN212K-T146
D891 D981 D982 D984		
D8A1	36CB0233	DIODE RB411D-T146
ZD671	360A0021	DIODE MTZJ3.6B T-72
ZD981	360A0026	DIODE MTZJ4.3A T-72
ZD521	360A0035	DIODE MTZJ5.1B T-72
ZD701 ZD702 ZD703 ZD704 ZD8A1 ZD8A2 ZD951	360A0039	DIODE MTZJ5.6B T-72
ZD5E1 ZD5X1 ZD622	360A0043 360A0052	DIODE MTZJ6.2B T-72 DIODE MTZJ7.5C-T72

SYMBOL	PARTS NO	DESCRIPTION
*** TRANSISTORS ***		
Q101 Q102 Q531 Q546 Q554 Q7E3 Q732 Q771 Q8A4 Q8G3	35AB0313	TR 2SA1037AK-T146 R
Q7Y1 Q7Y3 Q7Y5 Q7Y7	35AB1592	TR 2SA1434-T8
⚠Q5F1	35AB1596	TR 2SA1514K S-T
Q8G1	35BB1274	TR 2SB1197K R-T146
Q682	35CB0012	TR 2SC1623-T1B L6
Q411 Q5E1 ⚠Q5F3 Q501 Q545 Q553 Q7A2 Q7E2 Q7E4 Q7E5 Q735 Q772 Q793 Q795 Q8A1 Q8A3 Q8G2 Q8G5 Q951	35CB1113	TR 2SC2412K-T146 R
Q791 Q792 Q796 Q7E1	35CB2385 35CB2393	TR 2SC3735-T1B B34 TR 2SC3757 R-TX
Q7Y2 Q7Y4 Q7Y6 Q7Y8	35CB2468	TR 2SC3624-T1B-L18
Q891 Q892 Q981	35CB2491	TR 2SC3906K-E2
⚠Q5F2 ⚠Q5F4 Q543 Q544	35EB0212 35EB0229	TR DTA114WKA-T146 TR DTC143EKA-T146
Q511 Q512 Q513 Q542 Q571 Q574 Q673 Q734 Q797 Q802	35EB0230	TR DTC114EKA-T146
Q7A1 Q733 Q794 Q8A2 Q8G4	35EB0232	TR DTC144EKA-T146(O*)
Q103 Q104	35EB0238	TR DTC114YKA-T146
Q721B Q721G Q721R Q722B Q722G Q722R Q8A5 Q8A6	35KB2498	TR 2SK3018-T106
Q862 Q864	350A1500	TR 2SA1767-TA
Q983	350A2001	TR 2SA1038S-TP R
Q6V1	350D7216	TR 2SC945-T P
Q6P1 Q621	350E3218	TR 2SC1740S-T R
Q711B Q711G Q711R Q893	350H0200 350H4418	TR 2SC2407A-T TR,2SC1473-TA R
Q622 Q861 Q863	350J4817	TR 2SC1473A-TA Q

SYMBOL	PARTS NO	DESCRIPTION
ZD672	360A0054	DIODE MTZJ8.2A T-72
ZD592	360A0055	DIODE MTZJ8.2B T-72
ZD5G1	360A0059	DIODE MTZJ9.1B T-72
ZD721	360A0060	DIODE MTZJ9.1C T-72
ZD412	360A0071	DIODE MTZJ12A
ZD6P1 ZD621	360A0072	DIODE MTZJ12B
ZD552	360A0080	DIODE MTZJ15B-T72
⚠ZD5F1	360A0091	DIODE MTZJ20A
ZD5A1	360A0119	DIODE MTZJ33D-T72
D4H1 D4H2 D411 D5E3 D5G1 D541 D542 D571 D574 D593 D6V1 D6V2 D6V3 D6V4 D7E1 D7E2 D7E3 D714 D771 D781 D782 D791 D792 D8G1 D8G4 D8K1 D8K2 D801 D951 D952	360K1025	DIODE 1SS133
ZD623	360K3116	DIODE RD4.7EB(3)-T4
ZD6G1 ZD6H1	360K3120	DIODE RD24EB(3)-T4
ZD6V1	360K3638	DIODE RD5.6ESB(1)-T4
ZD8V2	360K3664	DIODE RD10ES AB3-T4
D8G5	361K7051	DI 1SR139-400 T31
D603	361K7174	DIODE RU1P V1
D624	361K7505	DIODE ERB44-06V1
D6P1 D6P2 D602	361K7523	DIODE ERA15-04V1
D552 D7K1	361K7562	DIODE EGP10G G23
⚠D5R2	361K7606	DIODE ERB44-08 V1
D5E1 D5E2 D741B	361K7777	DIODE 1SS244-T72
D741G D741R D783		
D401 D591 D592	361K7778	DIODE PR1004G,AT52
⚠D2001 ⚠D5R3 ⚠D5R4	361K7822	DIODE DINL20,AT52
⚠D5X1 D6K1 D604 D622 D623 D625 D626 D629 D672 D673	361K7823	DI ERA18-02-V1
D6Y3 D627 D628	361K7842	DIODE ERB38-06(V1)

SYMBOL	PARTS NO	DESCRIPTION
D5A1 D5A2 D5G3 D5G4 D512	361K8252	DI RB721Q-40T72
⚠D5R1	36107308	DIODE ERC20M-08
D6Y2	36107701	DIODE RU4AM(LF-K2)
D6F1	36107729	DIODE YG901C2
D551	36107771	DIODE FE5DL-6596
D553	36107775	DIODE RX3Z(LF014-102)
D5G2	36107792	DIODE YG911S3R
D6G2 D6H1	36107832	DI ERC30-01(L3)
D6A1	36107835	DI RU3C(LF-C4)
D6E1 D6Y1	36107841	DIODE FMU-G16S
D871	36107844	DIODE RU3A(LF-C4)
⚠D561	36107846	DIODE FMC-28UA
⚠D601	36108116	DIODE KBU605G-FA1
⚠D562	36108250	DIODE FMQ-G5FS
LED111	36801021	LED SML19416W-LF38
⚠TH6V1	38112071	POSISTOR (PTH451A180M270A
⚠TH6V2	38112072	POSISTOR (PTH451ABG3R0Q14
⚠PC6P1 ⚠PC621	38200354	PHOTOCOUPLER PC123FY2
*** TRANSFORMERS ***		
T551	45804033	TRANS,H.DRAIVE
T981	45950006	D.F.TRANS(W515L)
⚠L562	46204008	COIL,CHOKE 4MH
L5G2	46206023	COIL,CHOKE 4MH
⚠T601	46311121	SWITCHING TRANS
T6Y1	46316102	SWITCHING TRANS
⚠T5R1	47105731	FBT(PCS)
⚠T561	47710025	TRANS,H.OUTPUT
*** VARIABLE RESISTORS ***		
VR581	410G1157	R,VARIABLE B1.0K
⚠VR5T1	415K5163	R,VARIABLE B200K
*** RELAYS & SWITCHES ***		
SW581	65161075	SWITCH SLIDE SSSF022-S09N
⚠SW601	65360060	PUSH SWITCH ESB91631AXL
SW108	65360067	PUSH SWITCH ESB30
SW101 SW102 SW103 SW104 SW105 SW106	65361012	TACT SWITCH
SW107	65361012	TACT SWITCH
⚠RL571 ⚠RL572 ⚠RL6V1 ⚠RL6V2	65602052 65660047	RELAY DJ1-Q (12V) RELAY RPEF-12
*** COILS & FILTERS ***		
LC76E LC76L LC76R LC767 LC768	390J9028	FILTER ZJSC-R47-391TA
MRC801 MRC802	39040002	RC,NETWORK 10K 1K 0.01UF
⚠L571	60919182	COIL,H.LIN (13T/17T)
L791	610E1725	COIL,FILTER 47UH
L711	610E1729	COIL,FILTER 100UH
L622	610E4001	COIL,FILTER 10UH
L621	610E4006	COIL,FILTER 27UH
L901B L901G L901R	610FF502	COIL,FILTER 0.12UH
⚠L5R2	610F3014	COIL,FILTER 3.3UH
L6E1 L6H1 L6K1	610F3023	COIL,FILTER 33UH
L5G1 L763	610F3025	COIL,FILTER 47UH
⚠L561	610F3035	COIL,FILTER 330UH
L901B L901G L901R	610F6502	COIL,FILTER 0.12UH
LC903 L792 L793	610G0111	INDUCTOR,BEADS(FBR07HA121
⚠L5R1	610G0233	FILTER CHOKE PJ8T-470K
L6E2	610G0322	CHOKECOIL TSL0709-101KR66
L6F1 L6F2	610G0333	CHOKECOIL TSL1112RA-330K2
L6A1 L6H2	610G0335	CHOKECOIL TSL1112RA-680K1
⚠FL6T1 ⚠FL6T2	61062235	COIL,FILTER (LFZ2805V10)
L6Y1	61099161	COIL,CHOKE(SF-T12-75D-01)
⚠DEG	61321111	DEGAUSSING COIL(85T,5H)
EMF	61321309	COIL (85T,63H)
LC761B LC761G LC761R	616J9020	NOISE FILTER TX04200N8
L601 L602	616K5076	COIL,BEADS
LC763 LC764 LC765 LC766	616K6942	NOISE FILTER FILMAC TU20M
LC762B LC762G LC762R	616K6964	NOISE FILTER TX07250N8T
LC76M LC76N	616K6970	NOISE FILTER TY2E101MCT
LC76A LC76G LC76H	616K6971	NOISE FILTER TY2E103MCT
LC76K LC76P LC769 LC901 LC902		

SYMBOL	PARTS NO	DESCRIPTION
*** PWB ASSYS ***		
	847A2A01	SW/HV PWB ASSY
	847A2B01	COMP PWB ASSY
	847A2C02	VIDEO PWB ASSY
	847A2D01	DEF PWB ASSY
	847A2T01	TCO PWB ASSY
*** ELECTRICAL PARTS & MISCELLANEOUS PARTS ***		
HD562	31709503	SHEET,INSULATOR
HQ561	31709507	SHEET,INSULATOR HEAT SINK
SG901B SG901G SG901R SG902	329JK047	ARRESTER
SG901B SG901G SG901R SG902	329J0047	ARRESTER (300V),AT52
CN-FG	32990205	INSULATING CAP TIC-3.5(YE
CNBNC	32990278	BNC-MDSUB PANEL
X801	64098039	X'TAL(10.000MHZ)
⚠F6H1	666J9141	FUSE 25102.5,AT52
⚠F671	666J9242	FUSE 25101.6,AT52
⚠F6T1	66671040	FUSE 250V 5A(215)
SG903 ⚠SG951	667K6007	SPARK GAP 1.5KV
CNCRT	70032275	CRT SOCKET HPS0720-015005
⚠IN6T1	70521069	INLET SK-1019(DELTA)
CABLE	73893255	SIGNAL CABLE MD15P-MD15P
CORD	75513033	POWER CORD
IC4H1	79610568	UNIT,SENSOR TMC-3000NF-02
⚠ICD5P1	79644881	HV CONTROL UNIT
⚠IC2001	79645921	HV PROTECTOR UNIT
*** APPEARANCE PARTS ***		
	2E321561	CABINET BACK
	2E321811	CABINET FRONT ASSY
	2E429591	REVOLVING STAND ASSY
	2E787701	NAME PLATE,INSTRUCTION
	2E787721	LABEL(ESCUTCHON)
	25546391	CHASSIS BASE
	25786161	LABEL(TC095)
	25852641	SCREW,SPECIAL(5*25)
*** KNOBS & PUSH BUTTONS ***		
	2X456851	PUSH BUTTON(SW)(B)
*** PRINTED & PACKING MATERIALS ***		
	2E833831	SHEET PROTECTION
	2E835231	FILLER(T).CARTON
	2E835241	FILLER(B).CARTON
	2E835281	PLATE,PULL OUT
	2E835311	CARTON BOX(CN724R)
	24282111	BUSHING,INSULATOR
	24813191	BAG,POLYETHYLENE(150*370)
MANUAL	78133701	MANUAL CN724B USA
*** RESISTORS ***		
J402 J405 J406 J407 J417 J424 J425 J426 J427 J7E2 J7E3 J7E4	40AAD100	R,CHIP 0.0H 5% 1/2W
R904	40AAD133	R,CHIP 22H 5% 1/2W
R8A2 R8A4	40AAD146	R,CHIP 75H 5% 1/2W
R8A9	40AAD151	R,CHIP 120H 5% 1/2W
R718B R718G R718R	40AAD159	R,CHIP 270H 5% 1/2W
R521 R728	40AAD163	R,CHIP 390H 5% 1/2W
R716B R716G R716R	40AAD165	R,CHIP 470H 5% 1/2W
R405	40AAD175	R,CHIP 1.2K 5% 1/2W
R7E1	40AAD189	R,CHIP 4.7K 5% 1/2W
R893	40AAD197	R,CHIP 10K 5% 1/2W
R864	40AAD199	R,CHIP 12K 5% 1/2W
R896	40AAD205	R,CHIP 22K 5% 1/2W
R74GB R74GG R74GR R742B R742G R742R	40AAD213	R,CHIP 47K 5% 1/2W
J401 J403 J408 J409 J410 J411 J413 J414 J415 J416 J418 J419 J420 J421 J422 J423 J429 J7A1 J7A2 J7A3 J7A4 J7A5 J7A6 J7A7 J7A8 J7A9 J7E1	40AA1000	R,CHIP 0H 5% 1/8W

SYMBOL			PARTS NO	DESCRIPTION
J7E5	J7E6	J7E7	40AA1000	R,CHIP 0H 5% 1/8W
J7E8	J7E9	J7F1		
J7F3	J7F4	J7F5		
J7F6	J7F8	J7F9		
J7G1	J7G2	J7G3		
J7G4	J7G5	J951		
J952				
R581			40AA1165	R,CHIP 470H 5% 1/8W
R81E			40AA1173	R,CHIP 1.0K 5% 1/8W
R411			40AA1185	R,CHIP 3.3K 5% 1/8W
R597			40AA1197	R,CHIP 10K 5% 1/8W
R595			40AA1205	R,CHIP 22K 5% 1/8W
⚠R5F6			40AA1207	R,CHIP 27K 5% 1/8W
R596			40AA1213	R,CHIP 47K 5% 1/8W
R50K			40AA1215	R,CHIP 56K 5% 1/8W
R891			40AA1219	R,CHIP 82K 5% 1/8W
R86E			40AA1233	R,CHIP 330K 5% 1/8W
R573	R574	R575	40AA1239	R,CHIP 560K 5% 1/8W
R576	R577	R578		
R783			40AA1245	R,CHIP 1.0M 5% 1/8W
R7K2			40AA2000	R,CHIP 0.0H 5% 1/4W
R402			40AA2001	R,CHIP 1.0H 5% 1/4W
R989			40AA2009	R,CHIP 4.7H 5% 1/4W
⚠R5P1	⚠R5P2		40AA2133	R,CHIP 22H 5% 1/4E
R57N	R57P		40AA2149	R,CHIP 100H 5% 1/4W
R503	R7EA	R7EE	40AA2165	R,CHIP 470H 5% 1/4W
R7E2	R7E6		40AA2189	R,CHIP 4.7K 5% 1/4W
R7E7			40AA2195	R,CHIP 8.2K 5% 1/4W
R412			40AA2197	R,CHIP 10K 5% 1/4W
R5X2			40AA2199	R,CHIP 12K 5% 1/4W
C50G	R507	R555	40AA3000	R,CHIP 0.0H 5% 1/10W
R7AA	R7F1	R71K		
R715B	R715G	R715R		
R803	R804	R805		
R806	R807	R808		
R809	R815	R831		
R962				
R5G3			40AA3109	R,CHIP 2.2H 5% 1/10W
R558	R582	R812	40AA3125	R,CHIP 10H 5% 1/10W
R813	R814			
R73WB	R73WG	R73WR	40AA3137	R,CHIP 33H 5% 1/10W

SYMBOL			PARTS NO	DESCRIPTION
R80A	R81F	R810	40AA3173	R,CHIP 1.0K 5% 1/10W
R811	R816	R817		
R952	R96A			
R504	R541	R542	40AA3175	R,CHIP 1.2K 5% 1/10W
R70E	R709			
R675	R7F2	R71A	40AA3177	R,CHIP 1.5K 5% 1/10W
R79X	R794			
R5E2	R639	R7E3	40AA3179	R,CHIP 1.8K 5% 1/10W
R7E8	R793	R8AJ		
R54A	R7A8	R739	40AA3181	R,CHIP 2.2K 5% 1/10W
R79A	R79W			
R401			40AA3182	R,CHIP 2.4K 5% 1/10W
R8G6	R801	R802	40AA3183	R,CHIP 2.7K 5% 1/10W
R862				
R50A	R7YF	R7Y3	40AA3185	R,CHIP 3.3K 5% 1/10W
R7Y6	R7Y9	R748B		
R748G	R748R	R8G2		
R52T	R696	R79F	40AA3187	R,CHIP 3.9K 5% 1/10W
R536	R672	R79L	40AA3189	R,CHIP 4.7K 5% 1/10W
R8GH				
R7AH	R7AK		40AA3190	R,CHIP 5.1K 5% 1/10W
R5AC	R5A7	R59K	40AA3191	R,CHIP 5.6K 5% 1/10W
R791	R892			
R772			40AA3193	R,CHIP 6.8K 5% 1/10W
R5G2	R775		40AA3195	R,CHIP 8.2K 5% 1/10W
R4H2	R4H6	R5A5	40AA3197	R,CHIP 10K 5% 1/10W
R5A6	⚠R5F5	⚠R5F8		
R51L	R514	R537		
R545	R547	R59L		
R603	R633	R747B		
R747G	R747R	R771		
R79E	R79H	R79M		
R79T	R79U	R799		
R8A5	R8A6	R8A7		
R8GA	R8G1	R8G3		
R8G7	R951	R955		
R956				
R861			40AA3198	R,CHIP 11K 5% 1/10W
R59F			40AA3199	R,CHIP 12K 5% 1/10W
R5A3			40AA3201	R,CHIP 15K 5% 1/10W
R8G8			40AA3203	R,CHIP 18K 5% 1/10W
⚠R5F7	R79N		40AA3205	R,CHIP 22K 5% 1/10W

SYMBOL			PARTS NO	DESCRIPTION
R73XB	R73XG	R73XR	40AA3137	R,CHIP 33H 5% 1/10W
R798				
R549			40AA3141	R,CHIP 47H 5% 1/10W
R70A	R70F		40AA3143	R,CHIP 56H 5% 1/10W
R736R			40AA3145	R,CHIP 68H 5% 1/10W
R736G			40AA3147	R,CHIP 82H 5% 1/10W
R502	R53A	R53C	40AA3149	R,CHIP 100H 5% 1/10W
R53E	R53F	R538		
R539	R556	R57A		
R57C	R57E	R57F		
R57J	R579	R71F		
R71G	R712	R721B		
R721G	R721R	R726B		
R726G	R726R	R727B		
R727G	R727R	R731		
R732	R733	R734		
R736B	R752	R753		
R795	R796			
R717B	R717G	R717R	40AA3151	R,CHIP 120H 5% 1/10W
R719B	R719G	R719R		
R509			40AA3153	R,CHIP 150H 5% 1/10W
R71H			40AA3155	R,CHIP 180H 5% 1/10W
R745B	R745G	R745R	40AA3157	R,CHIP 220H 5% 1/10W
R7YE	R7Y2	R7Y5	40AA3161	R,CHIP 330H 5% 1/10W
R7Y8				
R50E	R781		40AA3167	R,CHIP 560H 5% 1/10W
R543	R544	R621	40AA3169	R,CHIP 680H 5% 1/10W
R640	R673	R738		
R774				
R641	R901B	R901G	40AA3171	R,CHIP 820H 5% 1/10W
R901R				
R5E4	R5E5	R50C	40AA3173	R,CHIP 1.0K 5% 1/10W
R505	R511	R516		
R52H	R52J	R52K		
R52L	R52M	R52N		
R52R	R531	R532		
R546	R7AL	R7AM		
R7A1	R7A7	R7E9		
R71E	R72E	R72F		
R751	R773	R79G		
R797B	R797G	R797R		
R8AE	R8AF	R8G4		

SYMBOL			PARTS NO	DESCRIPTION
R548	R8A1	R819	40AA3207	R,CHIP 27K 5% 1/10W
R598	R782	R8AA	40AA3209	R,CHIP 33K 5% 1/10W
R8AH	R954			
R7A9			40AA3212	R,CHIP 43K 5% 1/10W
R678	R73A	R73Y	40AA3213	R,CHIP 47K 5% 1/10W
R79K	R79P	R79R		
R8A3	R8A8			
R953			40AA3217	R,CHIP 68K 5% 1/10W
R697			40AA3219	R,CHIP 82K 5% 1/10W
R4H1	R4H5	⚠R5F4	40AA3221	R,CHIP 100K 5% 1/10W
R5X3	R59J	R642		
R784			40AA3231	R,CHIP 270K 5% 1/10W
R7YA	R7Y1	R7Y4	40AA3233	R,CHIP 330K 5% 1/10W
R7Y7	R787	R990		
⚠R5F3	R8GF		40AA3235	R,CHIP 390K 5% 1/10W
R5A8			40AA3239	R,CHIP 560K 5% 1/10W
R785	R786		40AA3242	R,CHIP 750K 5% 1/10W
R8G5			40AA3243	R,CHIP 820K 5% 1/10W
R792			40AA3245	R,CHIP 1.0M 5% 1/10W
R5G1			40AA5141	R,CHIP 47H 5% 1/4W
R866	R993		40AA5193	R,CHIP 6.8K 5% 1/4W
R868			40AA5196	R,CHIP 9.1K 5% 1/4W
R898			40AA5207	R,CHIP 27K 5% 1/4W
R984			40AB1171	R,CHIP 820H 1% 1/8W
R506	R534		40AB1179	R,CHIP 1.8K 1% 1/8W
⚠R5U3			40AB1224	R,CHIP 130K 1% 1/8W
R865	R894		40AB2187	R,CHIP 3.9K 1% 1/4W
R724B	R724G	R724R	40AB3145	R,CHIP 68H 1% 1/10W
R624			40AB3149	R,CHIP 100H 1% 1/10W
R701B	R701G	R701R	40AB3153	R,CHIP 150H 1% 1/10W
R702B	R702G	R702R		
R703B	R703G	R703R		
R704B	R704G	R704R		
R101	R725B	R725G	40AB3155	R,CHIP 180H 1% 1/10W
R725R				
R535			40AB3163	R,CHIP 390H 1% 1/10W
R501	R723B	R723G	40AB3167	R,CHIP 560H 1% 1/10W
R723R				
R992			40AB3169	R,CHIP 680H 1% 1/10W
R104	R105		40AB3170	R,CHIP 750H 1% 1/10W

SYMBOL			PARTS NO	DESCRIPTION
R102	R103		40AB3173	R,CHIP 1.0K 1% 1/10W
R4H8	R508		40AB3174	R,CHIP 1.1K 1% 1/10W
R524			40AB3176	R,CHIP 1.3K 1% 1/10W
R50G	R527	R714	40AB3177	R,CHIP 1.5K 1% 1/10W
R50F			40AB3179	R,CHIP 1.8K 1% 1/10W
R4H7	R7A3		40AB3181	R,CHIP 2.2K 1% 1/10W
⚠R5U1	R518	R73F	40AB3183	R,CHIP 2.7K 1% 1/10W
R4D4			40AB3184	R,CHIP 3.0K 1% 1/10W
R59G	R722B	R722G	40AB3185	R,CHIP 3.3K 1% 1/10W
R722R				
R7A2			40AB3187	R,CHIP 3.9K 1% 1/10W
R526			40AB3189	R,CHIP 4.7K 1% 1/10W
R73E			40AB3191	R,CHIP 5.6K 1% 1/10W
R51A	R529	R967	40AB3193	R,CHIP 6.8K 1% 1/10W
R50H			40AB3196	R,CHIP 9.1K 1% 1/10W
R51C	R51F	R51T	40AB3197	R,CHIP 10K 1% 1/10W
R52C	R52E	R52F		
R52G	R52W	R59C		
R593	R86F	R867		
R957	R958	R959	40AB3198	R,CHIP 11K 1% 1/10W
R59M	R594	R713	40AB3199	R,CHIP 12K 1% 1/10W
R4D3	R51R	R517	40AB3200	R,CHIP 13K 1% 1/10W
R5X5			40AB3201	R,CHIP 15K 1% 1/10W
R522			40AB3202	R,CHIP 16K 1% 1/10W
R515	R591		40AB3203	R,CHIP 18K 1% 1/10W
R73G	R74AB	R74AG	40AB3205	R,CHIP 22K 1% 1/10W
R74AR				
R59E			40AB3207	R,CHIP 27K 1% 1/10W
R971	R972	R973	40AB3209	R,CHIP 33K 1% 1/10W
R974				
R74EB	R74EG	R74ER	40AB3211	R,CHIP 39K 1% 1/10W
R51E	R51G		40AB3212	R,CHIP 43K 1% 1/10W
R52A	R528	R963	40AB3213	R,CHIP 47K 1% 1/10W
R7AG			40AB3214	R,CHIP 51K 1% 1/10W
R525	R629	R630	40AB3217	R,CHIP 68K 1% 1/10W
⚠R5U2	R519	R749B	40AB3219	R,CHIP 82K 1% 1/10W
R749G	R749R			
R59A	R746B	R746G	40AB3221	R,CHIP 100K 1% 1/10W
R746R				
R74FB	R74FG	R74FR	40AB3222	R,CHIP 110K 1% 1/10W

SYMBOL			PARTS NO	DESCRIPTION
R6V9	R6W1		401KE689	R,CARBON 4.7K 5% 1/6W
R6V5			401KE693	R,CARBON 6.8K 5% 1/6W
R8K5			401KE695	R,CARBON 8.2K 5% 1/6W
R6V3			401KE697	R,CARBON 10K 5% 1/6W
R6P2			401KE713	R,CARBON 47K 5% 1/6W
R6V6	R6V8		401KE721	R,CARBON 100K 5% 1/6W
R741B	R741G	R741R	401KE737	R,CARBON 470K 5% 1/6W
R8K1			401KE741	R,CARBON 680K 5% 1/6W
R6V7			401KE745	R,CARBON 1.0M 5% 1/6W
R4J4	R4K9		401K5609	R,CARBON 2.2H 5% 1/6W
R8J4			401K5625	R,CARBON 10H 5% 1/6W
R8H4			401K5629	R,CARBON 15H 5% 1/6W
R4M2	R4M3		401K5649	R,CARBON 100H 5% 1/6W
R6W3			401K5663	R,CARBON 390H 5% 1/6W
R6K2	R6V4		401K5669	R,CARBON 680H 5% 1/6W
R4K6	R4M1	R6W0	401K5673	R,CARBON 1.0K 5% 1/6W
R676			401K5681	R,CARBON 2.2K 5% 1/6W
R6V9	R6W1		401K5689	R,CARBON 4.7K 5% 1/6W
R6V5			401K5693	R,CARBON 6.8K 5% 1/6W
R8K5			401K5695	R,CARBON 8.2K 5% 1/6W
R6V3			401K5697	R,CARBON 10K 5% 1/6W
R6P2			401K5713	R,CARBON 47K 5% 1/6W
R6V6	R6V8		401K5721	R,CARBON 100K 5% 1/6W
R741B	R741G	R741R	401K5737	R,CARBON 470K 5% 1/6W
R8K1			401K5741	R,CARBON 680K 5% 1/6W
R6V7			401K5745	R,CARBON 1.0M 5% 1/6W
⚠R636			40178143	R,CARBON 56H 5% 1/2W
⚠R5R1	⚠R5R2		40224137	R,WIRE 33H 5% 5W
⚠R602	⚠R606		40299104	R,WIRE 10H 5% 5W
R605			40299181	R,WIRE 56K 5% 5W
R622			40371103	R,METAL 1.2H 5% 1W
R7F5			40371109	R,METAL 2.2H 5% 1W
R8GE			40371113	R,METAL 3.3H 5% 1W
R561			40371125	R,METAL 10H 5% 1W
R583			40371129	R,METAL 15H 5% 1W
R584			40371131	R,METAL 18H 5% 1W
R559			40371133	R,METAL 22H 5% 1W
R8GG			40371147	R,METAL 82H 5% 1W
R5E3			40371187	R,METAL 3.9K 5% 1W

SYMBOL			PARTS NO	DESCRIPTION
R592			40AB3223	R,CHIP 120K 1% 1/10W
R5X4			40AB3226	R,CHIP 160K 1% 1/10W
R744B	R744G	R744R	40AB3227	R,CHIP 180K 1% 1/10W
R5A4			40AB3229	R,CHIP 220K 1% 1/10W
R599	R743B	R743G	40AB3233	R,CHIP 330K 1% 1/10W
R743R				
R523			40AB5223	R,CHIP 120K 1% 1/2W
R4J6	R4K3	R8H6	401CF609	R,CARBON 2.2H 5% 1/4W
R8J6				
R902B	R902G	R902R	401CF629	R,CARBON 15H 5% 1/4W
R6V1			401CF631	R,CARBON 18H 5% 1/4W
R903			401CF649	R,CARBON 100H 5% 1/4W
R6G2			401CF671	R,CARBON 820H 5% 1/4W
R905			401CF689	R,CARBON 4.7K 5% 1/4W
R631	R632		401CF731	R,CARBON 270K 5% 1/4W
R4J6	R4K3	R8H6	401C6609	R,CARBON 2.2H 5% 1/4W
R8J6				
R902B	R902G	R902R	401C6629	R,CARBON 15H 5% 1/4W
R6V1			401C6631	R,CARBON 18H 5% 1/4W
R903			401C6649	R,CARBON 100H 5% 1/4W
R6G2			401C6671	R,CARBON 820H 5% 1/4W
R905			401C6689	R,CARBON 4.7K 5% 1/4W
R631	R632		401C6731	R,CARBON 270K 5% 1/4W
⚠R6V2			401G6109	R,CARBON 2.2H 5% 1/4W
⚠R985	⚠R986		401G6141	R,CARBON 47H 5% 1/4W
⚠R5F2			401G6191	R,CARBON 5.6K 5% 1/4W
R4K4			401HE641	R,CARBON 47H 5% 1/2W
R4J5			401H5625	R,CARBON 10H 5% 1/2W
R4K4			401H5641	R,CARBON 47H 5% 1/2W
⚠R995			401H5677	R,CARBON 1.5K 5% 1/2W
R6P1			401H5727	R,CARBON 180K 5% 1/2W
⚠R6T1			401H5743	R,CARBON 820K 5% 1/2W
R4J4	R4K9		401KE609	R,CARBON 2.2H 5% 1/6W
R8J4			401KE625	R,CARBON 10H 5% 1/6W
R8H4			401KE629	R,CARBON 15H 5% 1/6W
R4M2	R4M3		401KE649	R,CARBON 100H 5% 1/6W
R6W3			401KE663	R,CARBON 390H 5% 1/6W
R6K2	R6V4		401KE669	R,CARBON 680H 5% 1/6W
R4K6	R4M1	R6W0	401KE673	R,CARBON 1.0K 5% 1/6W
R678			401KE681	R,CARBON 2.2K 5% 1/6W

SYMBOL			PARTS NO	DESCRIPTION
R677			40371199	R,METAL 12K 5% 1W
R86A	R869		40371205	R,METAL 22K 5% 1W
R863			40371207	R,METAL 27K 5% 1W
R5AE	R6A1	R6A2	40371221	R,METAL 100K 5% 1W
⚠R5R3			40371329	R,METAL 0.22H 5% 1W
R623			40371337	R,METAL 0.47H 5% 1W
⚠R5F1			40371339	R,METAL 0.56H 5% 1W
⚠R562			40372131	R,METAL 18H 5% 2W
R604			40372143	R,METAL 56H 5% 2W
R8J5			40372147	R,METAL 82H 5% 2W
R8H5			40372151	R,METAL 120H 5% 2W
R7E4			40372169	R,METAL 680H 5% 2W
R6E1			40372199	R,METAL 12K 5% 2W
R638			40372201	R,METAL 15K 5% 2W
R634			40372213	R,METAL 47K 5% 2W
R991			40372215	R,METAL 56K 5% 2W
R635			40372217	R,METAL 68K 5% 2W
R671			40373109	R,METAL 2.2H 5% 3W
R674			40373187	R,METAL 3.9K 5% 3W
⚠R571			40383028	R,METAL 180H 5% 3W
R55A			40399092	R,METAL 1.2H 5% 5W
R4M5			404CA679	R,METAL 1.8K 1% 1/6W
R626			404CA689	R,METAL 4.7K 1% 1/6W
R8K2			404CA697	R,METAL 10K 1% 1/6W
R4M4			404CA698	R,METAL 11K 1% 1/6W
R4J2	R4K2	R8H2	404CA704	R,METAL 20K 1% 1/6W
R8J2				
R4J1	R4K1	R8H1	404CA714	R,METAL 51K 1% 1/6W
R8J1				
R6W2			404CA715	R,METAL 56K 1% 1/6W
R8K4			404CA716	R,METAL 62K 1% 1/6W
⚠R5T2			404CA718	R,METAL 75K 1% 1/6W
⚠R5T1			404CA731	R,METAL 270K 1% 1/6W
R627	R628	R694	404CA745	R,METAL 1.0M 1% 1/6W
R695				
R8J3			404C1626	R,METAL 11H 1% 1/6W
R8H3			404C1631	R,METAL 18H 1% 1/6W
R4M5			404C1679	R,METAL 1.8K 1% 1/6W
R86G			404C1685	R,METAL 3.3K 1% 1/6W
R626			404C1689	R,METAL 4.7K 1% 1/6W

SYMBOL			PARTS NO	DESCRIPTION
R8K2			404C1697	R,METAL 10K 1% 1/6W
R4M4			404C1698	R,METAL 11K 1% 1/6W
R4J2	R4K2	R8H2	404C1704	R,METAL 20K 1% 1/6W
R8J2				
R4J1	R4K1	R8H1	404C1714	R,METAL 51K 1% 1/6W
R8J1				
R6W2			404C1715	R,METAL 56K 1% 1/6W
R8K4			404C1716	R,METAL 62K 1% 1/6W
R5T2			404C1718	R,METAL 75K 1% 1/6W
R5T1			404C1731	R,METAL 270K 1% 1/6W
R627	R628	R694	404C1745	R,METAL 1.0M 1% 1/6W
R695				
⚠R6K1			404E1329	R,METAL 0.22H 5% 1/4W
⚠R5A9			404J9509	R,METAL 470H 1% 1/4W
⚠R5E1	⚠R557		404J9510	R,METAL 2.2H 5% 1/4W
R4K5			404K2628	R,METAL 13H 1% 1/4W
R4J3			404K3623	C,METAL 8.2H 1% 1/2W
⚠R2001			404K5109	R,METAL 2.2H 5% 1/4W
⚠R86B			404K5117	R,METAL 4.7H 5% 1/4W
⚠R4M8			404K5123	R,METAL 8.2H 5% 1/4W
⚠R4H9	⚠R5A1	⚠R5X1	404K5125	R,METAL 10H 5% 1/4W
⚠R50J	⚠R51P	⚠R7E5		
⚠R994				
⚠R5P3			404K5149	R,METAL 100H 5% 1/4W
R406			40499440	R,METAL 1.0H 1% 1W
R983			40499449	R,METAL 10K 2% 1W
R625			40499462	R,METAL 0.12H 5% 3W
⚠R6G1			40499507	R,METAL 0.22H 5% 1/2W
⚠R6F1			40499508	R,METAL 0.1H 5% 1/2W
*** CAPACITORS ***				
C80A	C80E	C80F	42AA1509	C,CHIP CERAMIC 50V 1000PF
C79G			42AA1515	C,CHIP CERAMIC 50V 3300PF
C742B	C742G	C742R	42AA1521	C,CHIP CERAMIC 50V 0.01UF
C862				
C748			42AA1538	C,CERAMIC 25V 0.1UF
C607			42AA2721	C,CERAMIC 50V 0.1UF
C471	C523	C529	42AA2726	C,CERAMIC 50V 0.01UF
C702B	C702G	C702R		

SYMBOL			PARTS NO	DESCRIPTION
C5E3	C7AE	C954	42CA1440	C,CERAMIC 50V 100PF
C955				
C79A			42CA1444	C,CERAMIC 50V 150PF
C7A8	C7E2	C722B	42CA1448	C,CERAMIC 50V 220PF
C722G	C722R			
C598			42CA1452	C,CHIP 50V 330PF
C8G1			42CA1454	C,CERAMIC 50V 390UF
C625			42CA1456	C,CERAMIC 50V 470PF
C892			42CA1464	C,CERAMIC 50V 1000PF
C891			42CE0115	C,CERAMIC 100V 100PF
⚠C57C			420C9066	C,CERAMIC 500V 1800PF
C902			420C9551	C,CERAMIC 500V 100PF
C901			420C9557	C,CERAMIC 500V 330PF
C553	C985	C988	420C9563	C,CERAMIC 500V 1000PF
C593			420C9567	C,CERAMIC 500V 2200PF
C554			420C9571	C,CERAMIC 500V 4700PF
C904			420D0019	C,CERAMIC 2KV 1000PF
⚠C6T2	⚠C6T3		420EJ013	C,CERAMIC 400V 1000PF
C622			420J8065	C,CERAMIC 1K 1200PF 10%
C864			420J9118	C,CERAMIC 500V 0.01UF
C903			4204K108	C,CERAMIC 2KV 0.01UF
⚠C608			42060330	C,CERAMIC 400V 2200PF
C8K1	C8K3		421A0425	C,CERAMIC 50V 0.01UF
C506			421C3335	C,CERAMIC 50V 470PF
C4M2	C6V2	C6V3	421C3479	C,CERAMIC 50V 0.1UF
C6V4				
C4J1	C4K1	C4K2	421D6009	C,CERAMIC 25V 0.1UF
C4K5	C4M3	C8H1		
C8H2	C8H5	C8J1		
C989			423E2111	C,CERAMIC 500V 10PF
C595	C794		427F4617	C,FILM 50V 0.022UF
C7E6			427F4620	C,FILM 50V 0.039UF
C5A5			427F4621	C,FILM 50V 0.047UF
C5A8	⚠C5T2	⚠C5U1	427F4625	C,FILM 50V 0.1UF
C795			427F4629	C,FILM 50V 0.22UF
C5A4			427F4643	C,FILM 50V 220PF 10%
C517	C520		427F4651	C,FILM 50V 1000PF
C515			427F4654	C,FILM 50V 1800PF
C51H			427F4658	C,FILM 50V 3900PF
C744B	C744G	C744R	427F4673	C,FILM 50V 0.068UF

SYMBOL			PARTS NO	DESCRIPTION
C704B	C704G	C704R	42AA2726	C,CERAMIC 50V 0.01UF
C712B	C712G	C712R		
C8G5	C95F	C959		
C964				
C4H2	C402	C406	42AA2744	C,CERAMIC 25V 0.1UF
C482	C5A1	C5A2		
⚠C5F4	⚠C5F5	⚠C5P2		
C50C	C502	C505		
C509	C51A	C51C		
C51F	C513	C519		
C52A	C52C	C521		
C522	C524	C525		
C532	C533	C534		
C535	C537	C539		
C542	C543	C544		
C57E	C57F	C57H		
C57J	C57K	C57M		
C571	C59C	C59E		
C591	C7A1	C7A9		
C7F2	C7F3	C71AB		
C71AG	C71AR	C71E		
C714B	C714G	C714R		
C716	C718	C721B		
C721G	C721R	C724		
C725	C73E	C732B		
C732G	C732R	C733B		
C733G	C733R	C738		
C739	C751	C752		
C79K	C796	C798		
C8A1	C8G3	C8G7		
C8G8	C8G9	C801		
C803	C814	C893		
C905	C95C	C951		
C957	C961	C965		
C966				
C869			42AJ9026	C,CERAMIC 630V 0.1UF
C808	C809		42CA1416	C,CERAMIC 50V 10PF
C723B	C723G	C723R	42CA1426	C,CERAMIC 50V 27PF
C7E8			42CA1428	C,CERAMIC 50V 33PF
C791	C793		42CA1430	C,CERAMIC 50V 39PF
C72AB	C72AG	C72AR	42CA1434	C,CERAMIC 50V 56PF
C953			42CA1436	C,CERAMIC 50V 68PF
C79E			42CA1438	C,CERAMIC 50V 82PF

SYMBOL			PARTS NO	DESCRIPTION
C771			427F4675	C,FILM 50V 0.1UF
⚠C5R4			42703464	C,FILM 630V 0.012UF
C7A3			428B3511	C,METAL 50V 0.068UF
C705	C707		428B3513	C,METAL FILM 50V 0.1UF
C511			428B3619	C,METAL 50V 0.33UF
C727			428C9002	C,METAL FILM 100V 0.1UF
C7E1			428C9022	C,METAL FILM 250V 0.1UF
⚠C5R2			428DE025	C,METAL 100V 1.0UF
C5E2			428D0053	C,METAL 100V 0.1UF
C743B	C743G	C743R	428D0093	C,METALFILM 250V 0.1UF
C5A7	C7E4	C729B	428D0097	C,FILM 250V 0.22UF
C729G	C729R			
C611			428D0225	C,METAL 630V 0.022UF
C407			428D4317	C,METAL FILM 100V 0.22UF
C5G2	C5G4		428D5093	C,METAL 250V 0.1UF
C673			428D6009	C,METAL 100V 0.1UF
C672			428D6011	C,METAL 100V 0.15UF
⚠C575			42816350	C,FILM 250V 0.082UF 5%
⚠C57A			42816352	C,FILM 250V 0.12UF 5%
⚠C573			42816354	C,FILM 250V 0.18UF 5%
⚠C577			42816367	C,FILM 250V 1.5UF 5%
⚠C576	⚠C579		42816377	C,FILM 250V 0.13UF 5%
⚠C574			42816380	C,FILM 250V 0.30UF 5%
⚠C578			42816385	C,FILM 250V 0.75UF 5%
⚠C5R3			42826301	C,FILM 800V 1000PF
C6Y2			42839869	C,METAL FILM 400V 1.0UF
C6Y1			42845186	C,METAL FILM 400V 1.2UF
⚠C6T1	⚠C6T4		42898002	C,FILM AC250V 0.47UF
⚠C561			42899184	C,METAL 2.0KV 4700PF
⚠C5F3			430B6016	C,ELEC 10V 100UF
C581			430B6017	C,ELEC 10V 220UF
C512	C52F	C531	430B6028	C,ELEC 16V 47UF
C7F1	C73A	C731		
C772	C781	C79F		
C8G4				
C7AA	C735	C764	430B6029	C,ELEC 16V 100UF
C766	C797	C802		
C765			430B6030	C,ELEC 16V 220UF
C715			430B6031	C,ELEC 16V 330UF
C483	C501		430B6032	C,ELEC 16V 470UF

SYMBOL			PARTS NO	DESCRIPTION
C4K3	C4K4	C4M1	430B6041	C,ELEC 25V 47UF
C481	C53A	C536		
C538	C57T	C59F		
C597	C8H3	C8H4		
C8K2	C8K4	C952		
C956				
C4H1	C59H	C7E7	430B6042	C,ELEC 25V 100UF
C5AC	C5A9		430B6043	C,ELEC 25V 220UF
C963			430B6061	C,ELEC 50V 1.0UF
C504	C508		430B6062	C,ELEC 50V 2.2UF
C4H3	C4H7	C472	430B6064	C,ELEC 50V 4.7UF
C473	C516	C527		
C545	C7A2	C7A4		
C95E				
C503	C51L	C526	430B6065	C,ELEC 50V 10UF
C596	C7A5	C7E5		
C79H	C799	C865		
C866	C894	C95A		
C986				
C528			430B6067	C,ELEC 50V 33UF
C773			430B6068	C,ELEC 50V 47UF
C6P1			430B6082	C,ELEC 63V 10UF
C86A			430B6098	C,ELEC 100V 10UF
C728	C984		430B6101	C,ELEC 100V 47UF
C5X2			430B6514	C,ELEC 160V 3.3UF
C783			430B6552	C,ELEC 250V 1.0UF
C747			430B6556	C,ELEC 250V 10UF
C7E3	C709	C8A2	430B8144	C,ELEC 16V 47UF
C73F			430B8179	C,ELEC 50V 10UF
⚠C5F1			430B9016	C,ELEC 10V 100UF
C6K1			430B9020	C,ELEC 10V 1000UF
C71FB	C71FG	C71FR	430B9028	C,ELEC 16V 47UF
C713B	C713G	C713R		
C717				
C726			430B9030	C,ELEC 16V 220UF
⚠C5P1			430B9041	C,ELEC 25V 47UF
⚠C5T1			430B9064	C,ELEC 50V 4.7UF
C867			430B9065	C,ELEC 50V 10UF
⚠C2001			430B9066	C,ELEC 50V 22UF
C403			430B9070	C,ELEC 50V 220UF
C401	C405		430B9071	C,ELEC 50V 330UF

SYMBOL			PARTS NO	DESCRIPTION
C896			430B9094	C,ELEC 100V 1.0UF
C5E1			430B9096	C,ELEC 100V 3.3UF
C987			430B9098	C,ELEC 100V 10 UF
C983			430B9101	C,ELEC 100V 47UF
⚠C5X1	C824		430B9516	C,ELEC 160V 10UF
C741B	C741G	C741R	430B9552	C,ELEC 250V 1.0UF
C592	C868		430B9553	C,ELEC 250V 2.2UF
C8G6			430C6531	C,ELEC 16V 10UF
C50F			430C8522	C,ELEC 25V 330UF
C621			430C9502	C,ELEC 35V 220UF
C671			430C9503	C,ELEC 100V 47UF
C6K2			430E2027	C,ELEC 16V 100UF M
⚠C2002			430E2044	C,ELEC 25V 100UF M
C6F3	C6H2		430E2047	C,ELEC 25V 470UF M
C674			430E2102	C,ELEC 100V 1UF M
C6V1			430E3041	C,ELEC 25V 470UF M
C6E2			4302F102	C,ELEC 100V 100UF
C6A2			4302F557	C,ELEC 250V 22UF
C6F1	C6F2	C6G2	4302J047	C,ELEC 25V 2200UF
C6H1				
C6E1	C6E3		4302J104	C,ELEC 100V 330UF
C5A6			4302J556	C,ELEC 250V 10UF
C5G3			4302J558	C,ELEC 250V 33UF
C623			43029071	C,ELEC 50V 330UF
C552			4303H527	C,ELEC 25V 2200UF
C6A1			4303J149	C,ELEC 250V 220UF
⚠C5R1			4309J196	C,ELEC 100V 120UF
C5G1			4309J236	C,ELEC 350V 33UF
C609	C610		43113178	C,ELEC 400V 330UF M
⚠C5F2			433A4013	C,ELEC 10V 47UF
C582			433A4026	C,ELEC 16V 100UF
C958			433A4033	C,ELEC 25V 10UF
C7A6			433A4056	C,ELEC 50V 2.2UF
C711B	C711G	C711R	433A4057	C,ELEC 50V 3.3UF
C706	C708		433A6143	C,ELEC 16V 10UF
C52E			433A6147	C,ELEC 16V 47UF
C701B	C701G	C701R	433A6148	C,ELEC 16V 100UF
C703B	C703G	C703R		
⚠C562			433A7014	C,ELEC 16V 100UF
C5A3			433A7046	C,ELEC 50V 10UF

REPLACEMENT PARTS LIST

The components specified for Model JC-2148UMW (AS)

Note: The components identified by⚠ make are critical for safety.
Replace only with parts Number specified.

SYMBOL	PARTS NO	DESCRIPTION
*** CRT & TUNER ***		
⚠CRT	33021511	CRT M50LJG39X27
*** ICS ***		
IC571	37REH024	MOS M62320FP-D-T2
IC591	370AA067	IC BA10324AF-E2(OP-AMP)
IC5A1 IC522	370AA092	IC BA4558F-E2(OP-AMP)
IC533 IC952	370AA113	IC BA10358F-E2 (OP-AMP)
IC521	370EF021	IC CA0007AM-T
IC531	370EF031	MOS M62393FP-D
IC532	370EF032	MOS M62392FP-D
IC512	370EF033	MOS HD14040BFP-EL
IC541	370E3120	MOS HD74HC74FP-EL
IC511	370E6178	IC BA14741F-E2
IC8G2	370K5002	IC UPC78L05J-T
IC481	37005221	IC UPC78M09AHF
IC471	37005250	IC UPC78M12AHF
IC8G1	37005277	IC PQ05RR13 (REG)
IC401	37006022	IC LA7846N
IC501	37009036	IC UPC1883ACT
IC4K1 IC8H1	37011003	IC LA6510
IC8K1	37011247	IC UPC814C (OP-AMP)
IC742	37011354	IC KIA324P
IC951	37011363	IC M52723SP
IC721	37011380	IC VPS16
IC731	37011391	IC M52755SP
IC711	37011392	IC M52742SP
IC802	37055589	MOS M24C08-BN6
IC6V1	37056615	IC BA10393
IC4H3	37056616	IC BA10358
IC4M1 IC751	37076176	MOS M62393P
IC7A1	37076304	IC M52347SP
IC671	37076357	IC SE080N(LF12)
IC8A1	37076381	MOS 24LCS21A-I/P
IC791	37076402	MOS LSC4501P2
⚠IC621	37076406	IC STR-S6729A(LF953)
IC7F1	37076408	IC SI-3062FA
IC592	37076409	IC BA9757
IC801	37076414	MOS UPD78015FYCW

SYMBOL	PARTS NO	DESCRIPTION
Q741B Q741G Q741R	350J5205	TR 2SC3415S-TP
Q781		
Q982	350J5241	TR 2SC2389S-TP R
Q987	350J5262	TR 2SC4620 P-TV2
Q5X1 Q5X2	350K4112	TR 2SA916-T L
Q894	350K5218	TR,2SA1018-TA R
Q671	35030000	TR 2SB1626
Q985	35030012	TR 2SB1186A E
Q581	35072612	TR 2SD2396 J
Q5A1	35072720	TR 2SD1889
Q984	35072752	TR 2SD1763A E
Q624 Q625	35092400	TR 2SC3852A
Q623	35095270	TR 2SC2317
⚠Q561	35095411	TR 2SC5453
Q8G6	351G0580	TR DTC114ESA-T
Q5G1	35127790	TR 2SJ449
Q572 Q573	35128003	TR 2SK2098-01MR(F119)
⚠Q5R1	35128009	TR 2SK2645-01MR(F111)
Q555	35128023	TR IRLS530A
MQ571	35135000	TR SLA5046 (FET-ARRAY)
⚠CR601	35595026	TRIAC AC10FSM
Q672	359D7406	TR 2SC1845-T F
*** DIODES ***		
MD701B MD701G MD701R MD702B MD702G MD702R MD712	36CB0054	DIODE DA204K-T
D721B D721G D721R D722B D722G D722R D784	36CB0072	DIODE HSM83-TL
MD711 MD771 MD8G1	36CB0079	DIODE DAN202K-T146(0°)
⚠D2002 ⚠D5P1 D861	36CB0213	DIODE DAN212K-T146
D891 D981 D982 D984		
D8A1	36CB0233	DIODE RB411D-T146
ZD671	360A0021	DIODE MTZJ3.6B T-72
ZD981	360A0026	DIODE MTZJ4.3A T-72
ZD521	360A0035	DIODE MTZJ5.1B T-72
ZD701 ZD702 ZD703 ZD704 ZD8A1 ZD8A2 ZD951	360A0039	DIODE MTZJ5.6B T-72
ZD5E1 ZD5X1	360A0043	DIODE MTZJ6.2B T-72
ZD622	360A0052	DIODE MTZJ7.5C-T72

SYMBOL	PARTS NO	DESCRIPTION
*** TRANSISTORS ***		
Q101 Q102 Q531 Q546 Q554 Q7E3 Q732 Q771 Q8A4 Q8G3	35AB0313	TR 2SA1037AK-T146 R
Q7Y1 Q7Y3 Q7Y5 Q7Y7	35AB1592	TR 2SA1434-TB
⚠Q5F1	35AB1596	TR 2SA1514K S-T
Q8G1	35BB1274	TR 2SB1197K R-T146
Q682	35CB0012	TR 2SC1623-T1B L6
Q411 Q5E1 ⚠Q5F3 Q501 Q545 Q553 Q7A2 Q7E2 Q7E4 Q7E5 Q735 Q772 Q793 Q795 Q8A1 Q8A3 Q8G2 Q8G5 Q951	35CB1113	TR 2SC2412K-T146 R
Q791 Q792 Q796 Q7E1	35CB2385 35CB2393	TR 2SC3735-T1B B34 TR 2SC3757 R-TX
Q7Y2 Q7Y4 Q7Y6 Q7Y8	35CB2468	TR 2SC3624-T1B-L18
Q891 Q892 Q981	35CB2491	TR 2SC3906K-E2
⚠Q5F2 ⚠Q5F4 Q543 Q544	35EB0212 35EB0229	TR DTA114WKA-T146 TR DTC143EKA-T146
Q511 Q512 Q513 Q542 Q571 Q574 Q673 Q734 Q797 Q802	35EB0230	TR DTC114EKA-T146
Q7A1 Q733 Q794 Q8A2 Q8G4	35EB0232	TR DTC144EKA-T146(0°)
Q103 Q104	35EB0238	TR DTC114YKA-T146
Q721B Q721G Q721R Q722B Q722G Q722R Q8A5 Q8A6	35KB2498	TR 2SK3018-T106
Q862 Q864	350A1500	TR 2SA1767-TA
Q983	350A2001	TR 2SA1038S-TP R
Q6V1	350D7216	TR 2SC945-T P
Q6P1 Q621	350E3218	TR 2SC1740S-T R
Q711B Q711G Q711R Q893	350H0200	TR 2SC2407A-T
Q622 Q861 Q863	350H4418 350J4817	TR,2SC1473-TA R TR 2SC1473A-TA Q

SYMBOL	PARTS NO	DESCRIPTION
ZD672	360A0054	DIODE MTZJ8.2A T-72
ZD592	360A0055	DIODE MTZJ8.2B T-72
ZD5G1	360A0059	DIODE MTZJ9.1B T-72
ZD721	360A0060	DIODE MTZJ9.1C T-72
ZD412	360A0071	DIODE MTZJ12A
ZD6P1 ZD621	360A0072	DIODE MTZJ12B
ZD552	360A0080	DIODE MTZJ15B-T72
⚠ZD5F1	360A0091	DIODE MTZJ20A
ZD5A1	360A0119	DIODE MTZJ33D-T72
D4H1 D4H2 D411 D5E3 D5G1 D541 D542 D571 D574 D593 D6V1 D6V2 D6V3 D6V4 D7E1 D7E2 D7E3 D714 D771 D781 D782 D791 D792 D8G1 D8G4 D8K1 D8K2 D801 D951 D952	360K1025	DIODE 1SS133
ZD623	360K3116	DIODE RD4.7EB(3)-T4
ZD6G1 ZD6H1	360K3120	DIODE RD24EB(3)-T4
ZD6V1	360K3638	DIODE RD5.6ESB(1)-T4
ZD6V2	360K3664	DIODE RD10ES AB3-T4
D8G5	361K7051	DI 1SR139-400 T31
D603	361K7174	DIODE RU1P V1
D624	361K7505	DIODE ERB44-06V1
D6P1 D6P2 D602	361K7523	DIODE ERA15-04V1
D552 D7K1	361K7562	DIODE EGP10G G23
⚠D5R2	361K7606	DIODE ERB44-08 V1
D5E1 D5E2 D741B D741G D741R D783	361K7777	DIODE 1SS244-T72
D401 D591 D592	361K7778	DIODE PR1004G,AT52
⚠D2001 ⚠D5R3 ⚠D5R4 ⚠D5X1	361K7822	DIODE D1NL20,AT52
D6K1 D604 D622 D623 D625 D626 D629 D672 D673	361K7823	DI ERA18-02-V1
D6Y3 D627 D628	361K7842	DIODE ERB38-06(V1)

SYMBOL	PARTS NO	DESCRIPTION
D5A1 D5A2 D5G3 D5G4 D512	361K8252	DI RB721Q-40T72
⚠D5R1	36107308	DIODE ERC20M-08
D6Y2	36107701	DIODE RU4AM(LF-K2)
D6F1	36107729	DIODE YG901C2
D551	36107771	DIODE FE5DL-8596
D553	36107775	DIODE RX3Z(LF014-102)
D5G2	36107792	DIODE YG911S3R
D6G2 D6H1	36107832	DI ERC30-01(L3)
D6A1	36107835	DI RU3C(LF-C4)
D6E1 D6Y1	36107841	DIODE FMU-G16S
D671	36107844	DIODE RU3A(LF-C4)
⚠D561	36107846	DIODE FMC-28UA
⚠D601	36108116	DIODE KBU605G-FA1
⚠D562	36108250	DIODE FMQ-G5FS
LED111	36801021	LED SML19416W-LF38
⚠TH6V1	38112071	POSISTOR (PTH451A180M270A
⚠TH6V2	38112072	POSISTOR (PTH451A8G3R0Q14
⚠PC6P1 ⚠PC621	38200354	PHOTOCOUPLER PC123FY2
*** TRANSFORMERS ***		
T551	45804033	TRANS,H.DRAIVE
T981	45950006	D.F.TRANS(W515L)
⚠L562	46204008	COIL,CHOKE 4MH
L5G2	46206023	COIL,CHOKE 4MH
⚠T601	46311121	SWITCHING TRANS
T6Y1	46316102	SWITCHING TRANS
⚠T5R1	47105731	FBT(PCS)
⚠T561	47710025	TRANS,H.OUTPUT
*** VARIABLE RESISTORS ***		
VR581	410G1157	R,VARIABLE B1.0K
⚠VR5T1	415K5163	R,VARIABLE B200K
*** RELAYS & SWITCHES ***		
SW581	65161075	SWITCH SLIDE SSSF022-S09N
⚠SW601	65360060	PUSH SWITCH ESB91631AXL
SW108	65360067	PUSH SWITCH ESB30
SW101 SW102 SW103 SW104 SW105 SW106	65361012	TACT SWITCH

SYMBOL	PARTS NO	DESCRIPTION
*** PWB ASSYS ***		
	847A2A01	SW/HV PWB ASSY
	847A2B01	COMP PWB ASSY
	847A2C02	VIDEO PWB ASSY
	847A2D01	DEF PWB ASSY
	847A2T01	TCO PWB ASSY
*** ELECTRICAL PARTS & MISCELLANEOUS PARTS ***		
HD562	31709503	SHEET,INSULATOR
HQ561	31709507	SHEET,INSULATOR HEAT SINK
SG901B SG901G SG901R SG902	329JK047	ARRESTER
SG901B SG901G SG901R SG902	329J0047	ARRESTER (300V),AT52
CN-FG	32990205	INSULATING CAP TIC-3.5(YE
CNBNC	32990278	BNC-MDSUB PANEL
X801	64098039	X'TAL(10.000MHZ)
⚠F6H1	666J9141	FUSE 25102.5,AT52
⚠F671	666J9242	FUSE 25101.6,AT52
⚠F6T1	66671040	FUSE 250V 5A(215)
SG903 ⚠SG951	667K6007	SPARK GAP 1.5KV
CNCRT	70032275	CRT SOCKET HPS0720-015005
⚠IN6T1	70521069	INLET SK-1019(DELTA)
CORD	70800087	POWER CORD E-2 L1.8 GRY
CABLE	73893255	SIGNAL CABLE MD15P-MD15P
IC4H1	79610568	UNIT,SENSOR TMC-3000NF-02
⚠IC05P1	79644881	HV CONTROL UNIT
⚠IC2001	79645921	HV PROTECTOR UNIT
*** APPEARANCE PARTS ***		
	2E321561	CABINET BACK
	2E321811	CABINET FRONT ASSY
	2E429591	REVOLVING STAND ASSY
	2E787691	NAME PLATE,INSTRUCTION
	2E787721	LABEL(ESCUTCHON)
	25321821	CABINET FRONT
	25546391	CHASSIS BASE
	25786161	LABEL(TCO95)
	25852641	SCREW,SPECIAL(5*25)

SYMBOL	PARTS NO	DESCRIPTION
SW107	65361012	TACT SWITCH
⚠RL571 ⚠RL572 ⚠RL6V1 ⚠RL6V2	65602052 65660047	RELAY DJ1-Q (12V) RELAY RPEF-12
*** COILS & FILTERS ***		
LC76E LC76L LC76R LC767 LC768	390J9028	FILTER ZJSC-R47-391TA
MRC801 MRC802	39040002	RC,NETWORK 10K 1K 0.01UF
⚠L571	60919182	COIL,H.LIN (13T/17T)
L791	610E1725	COIL,FILTER 47UH
L711	610E1729	COIL,FILTER 100UH
L622	610E4001	COIL,FILTER 10UH
L621	610E4006	COIL,FILTER 27UH
L901B L901G L901R	610FF502	COIL,FILTER 0.12UH
⚠L5R2	610F3014	COIL,FILTER 3.3UH
L6E1 L6H1 L6K1	610F3023	COIL,FILTER 33UH
L5G1 L763	610F3025	COIL,FILTER 47UH
⚠L561	610F3035	COIL,FILTER 330UH
L901B L901G L901R	610F6502	COIL,FILTER 0.12UH
LC903 L792 L793	610G0111	INDUCTOR,BEADS(FBR07HA121
⚠L5R1	610G0233	FILTER CHOKE PJ8T-470K
L6E2	610G0322	CHOKECOIL TSL0709-101KR66
L6F1 L6F2	610G0333	CHOKECOIL TSL1112RA-330K2
L6A1 L6H2	610G0335	CHOKECOIL TSL1112RA-680K1
⚠FL6T1 ⚠FL6T2	61062235	COIL,FILTER (LFZ2805V10)
L6Y1	61099161	COIL,CHOKE(SF-T12-75D-01)
⚠DEG	61321111	DEGAUSSING COIL(85T,5H)
EMF	61321309	COIL (85T,63H)
LC761B LC761G LC761R	616J9020	NOISE FILTER TX04200NB
L601 L602	616K5076	COIL,BEADS
LC763 LC764 LC765 LC766	616K6942	NOISE FILTER FILMAC TU20M
LC762B LC762G LC762R	616K6964	NOISE FILTER TX07250NBT
LC76M LC76N	616K6970	NOISE FILTER TY2E101MCT
LC76A LC76G LC76H LC76K LC76P LC769	616K6971	NOISE FILTER TY2E103MCT
LC901 LC902		

SYMBOL	PARTS NO	DESCRIPTION
*** KNOBS & PUSH BUTTONS ***		
	2X456851	PUSH BUTTON(SW)(B)
*** PRINTED & PACKING MATERIALS ***		
	2E833831	SHEET PROTECTION
	2E835231	FILLER(T).CARTON
	2E835241	FILLER(B).CARTON
	2E835281	PLATE,PULL OUT
	2E835301	CARTON BOX(CN724B)
	24282111	BUSHING,INSULATOR
	24813191	BAG,POLYETHYLENE(150*370)
MANUAL	78133701	MANUAL CN724B USA
*** RESISTORS ***		
J402 J405 J406 J407 J417 J424 J425 J426 J427 J7E2 J7E3 J7E4	40AAD100	R,CHIP 0.0H 5% 1/2W
R904	40AAD133	R,CHIP 22H 5% 1/2W
R8A2 R8A4	40AAD146	R,CHIP 75H 5% 1/2W
R8A9	40AAD151	R,CHIP 120H 5% 1/2W
R718B R718G R718R	40AAD159	R,CHIP 270H 5% 1/2W
R521 R728	40AAD163	R,CHIP 390H 5% 1/2W
R716B R716G R716R	40AAD165	R,CHIP 470H 5% 1/2W
R405	40AAD175	R,CHIP 1.2K 5% 1/2W
R7E1	40AAD189	R,CHIP 4.7K 5% 1/2W
R893	40AAD197	R,CHIP 10K 5% 1/2W
R864	40AAD199	R,CHIP 12K 5% 1/2W
R896	40AAD205	R,CHIP 22K 5% 1/2W
R74GB R74GG R74GR R742B R742G R742R	40AAD213	R,CHIP 47K 5% 1/2W
J401 J403 J408 J409 J410 J411 J413 J414 J415 J416 J418 J419 J420 J421 J422 J423 J429 J7A1 J7A2 J7A3 J7A4 J7A5 J7A6 J7A7 J7A8 J7A9 J7E1	40AA1000	R,CHIP 0H 5% 1/8W

SYMBOL			PARTS NO	DESCRIPTION
J7E5	J7E6	J7E7	40AA1000	R.CHIP 0H 5% 1/8W
J7E8	J7E9	J7F1		
J7F3	J7F4	J7F5		
J7F6	J7F8	J7F9		
J7G1	J7G2	J7G3		
J7G4	J7G5	J951		
J952				
R581			40AA1165	R.CHIP 470H 5% 1/8W
R81E			40AA1173	R.CHIP 1.0K 5% 1/8W
R411			40AA1185	R.CHIP 3.3K 5% 1/8W
R597			40AA1197	R.CHIP 10K 5% 1/8W
R595			40AA1205	R.CHIP 22K 5% 1/8W
⚠R5F6			40AA1207	R.CHIP 27K 5% 1/8W
R596			40AA1213	R.CHIP 47K 5% 1/8W
R50K			40AA1215	R.CHIP 56K 5% 1/8W
R891			40AA1219	R.CHIP 82K 5% 1/8W
R86E			40AA1233	R.CHIP 330K 5% 1/8W
R573	R574	R575	40AA1239	R.CHIP 560K 5% 1/8W
R576	R577	R578		
R783			40AA1245	R.CHIP 1.0M 5% 1/8W
R7K2			40AA2000	R.CHIP 0.0H 5% 1/4W
R402			40AA2001	R.CHIP 1.0H 5% 1/4W
R989			40AA2009	R.CHIP 4.7H 5% 1/4W
⚠R5P1	⚠R5P2		40AA2133	R.CHIP 22H 5% 1/4E
R57N	R57P		40AA2149	R.CHIP 100H 5% 1/4W
R503	R7EA	R7EE	40AA2165	R.CHIP 470H 5% 1/4W
R7E2	R7E6		40AA2189	R.CHIP 4.7K 5% 1/4W
R7E7			40AA2195	R.CHIP 8.2K 5% 1/4W
R412			40AA2197	R.CHIP 10K 5% 1/4W
R5X2			40AA2199	R.CHIP 12K 5% 1/4W
C50G	R507	R555	40AA3000	R.CHIP 0.0H 5% 1/10W
R7AA	R7F1	R71K		
R715B	R715G	R715R		
R803	R804	R805		
R806	R807	R808		
R809	R815	R831		
R962				
R5G3			40AA3109	R.CHIP 2.2H 5% 1/10W
R558	R582	R812	40AA3125	R.CHIP 10H 5% 1/10W
R813	R814			
R73WB	R73WG	R73WR	40AA3137	R.CHIP 33H 5% 1/10W

SYMBOL			PARTS NO	DESCRIPTION
R80A	R81F	R810	40AA3173	R.CHIP 1.0K 5% 1/10W
R811	R816	R817		
R952	R96A			
R504	R541	R542	40AA3175	R.CHIP 1.2K 5% 1/10W
R70E	R709			
R675	R7F2	R71A	40AA3177	R.CHIP 1.5K 5% 1/10W
R79X	R794			
R5E2	R639	R7E3	40AA3179	R.CHIP 1.8K 5% 1/10W
R7E8	R793	R8AJ		
R54A	R7A8	R739	40AA3181	R.CHIP 2.2K 5% 1/10W
R79A	R79W			
R401			40AA3182	R.CHIP 2.4K 5% 1/10W
R8G6	R801	R802	40AA3183	R.CHIP 2.7K 5% 1/10W
R862				
R50A	R7YF	R7Y3	40AA3185	R.CHIP 3.3K 5% 1/10W
R7Y6	R7Y9	R748B		
R748G	R748R	R8G2		
R52T	R696	R79F	40AA3187	R.CHIP 3.9K 5% 1/10W
R536	R672	R79L	40AA3189	R.CHIP 4.7K 5% 1/10W
R8GH				
R7AH	R7AK		40AA3190	R.CHIP 5.1K 5% 1/10W
R5AC	R5A7	R59K	40AA3191	R.CHIP 5.6K 5% 1/10W
R791	R892			
R772			40AA3193	R.CHIP 6.8K 5% 1/10W
R5G2	R775		40AA3195	R.CHIP 8.2K 5% 1/10W
R4H2	R4H6	R5A5	40AA3197	R.CHIP 10K 5% 1/10W
R5A6	⚠R5F5	⚠R5F8		
R51L	R514	R537		
R545	R547	R59L		
R603	R633	R747B		
R747G	R747R	R771		
R79E	R79H	R79M		
R79T	R79U	R799		
R8A5	R8A6	R8A7		
R8GA	R8G1	R8G3		
R8G7	R951	R955		
R956				
R861			40AA3198	R.CHIP 11K 5% 1/10W
R59F			40AA3199	R.CHIP 12K 5% 1/10W
R5A3			40AA3201	R.CHIP 15K 5% 1/10W
R8G8			40AA3203	R.CHIP 18K 5% 1/10W
⚠R5F7	R79N		40AA3205	R.CHIP 22K 5% 1/10W

SYMBOL			PARTS NO	DESCRIPTION
R73XB	R73XG	R73XR	40AA3137	R.CHIP 33H 5% 1/10W
R798				
R549			40AA3141	R.CHIP 47H 5% 1/10W
R70A	R70F		40AA3143	R.CHIP 56H 5% 1/10W
R736R			40AA3145	R.CHIP 68H 5% 1/10W
R736G			40AA3147	R.CHIP 82H 5% 1/10W
R502	R53A	R53C	40AA3149	R.CHIP 100H 5% 1/10W
R53E	R53F	R538		
R539	R556	R57A		
R57C	R57E	R57F		
R57J	R579	R71F		
R71G	R712	R721B		
R721G	R721R	R726B		
R726G	R726R	R727B		
R727G	R727R	R731		
R732	R733	R734		
R736B	R752	R753		
R795	R796			
R717B	R717G	R717R	40AA3151	R.CHIP 120H 5% 1/10W
R719B	R719G	R719R		
R509			40AA3153	R.CHIP 150H 5% 1/10W
R71H			40AA3155	R.CHIP 180H 5% 1/10W
R745B	R745G	R745R	40AA3157	R.CHIP 220H 5% 1/10W
R7YE	R7Y2	R7Y5	40AA3161	R.CHIP 330H 5% 1/10W
R7Y8				
R50E	R781		40AA3167	R.CHIP 560H 5% 1/10W
R543	R544	R621	40AA3169	R.CHIP 680H 5% 1/10W
R640	R673	R738		
R774				
R641	R901B	R901G	40AA3171	R.CHIP 820H 5% 1/10W
R901R				
R5E4	R5E5	R50C	40AA3173	R.CHIP 1.0K 5% 1/10W
R505	R511	R516		
R52H	R52J	R52K		
R52L	R52M	R52N		
R52R	R531	R532		
R546	R7AL	R7AM		
R7A1	R7A7	R7E9		
R71E	R72E	R72F		
R751	R773	R79G		
R797B	R797G	R797R		
R8AE	R8AF	R8G4		

SYMBOL			PARTS NO	DESCRIPTION
R548	R8A1	R819	40AA3207	R.CHIP 27K 5% 1/10W
R598	R782	R8AA	40AA3209	R.CHIP 33K 5% 1/10W
R8AH	R954			
R7A9			40AA3212	R.CHIP 43K 5% 1/10W
R678	R73A	R73Y	40AA3213	R.CHIP 47K 5% 1/10W
R79K	R79P	R79R		
R8A3	R8A8			
R953			40AA3217	R.CHIP 68K 5% 1/10W
R697			40AA3219	R.CHIP 82K 5% 1/10W
R4H1	R4H5	⚠R5F4	40AA3221	R.CHIP 100K 5% 1/10W
R5X3	R59J	R642		
R784			40AA3231	R.CHIP 270K 5% 1/10W
R7YA	R7Y1	R7Y4	40AA3233	R.CHIP 330K 5% 1/10W
R7Y7	R787	R990		
⚠R5F3	R8GF		40AA3235	R.CHIP 390K 5% 1/10W
R5A8			40AA3239	R.CHIP 560K 5% 1/10W
R785	R786		40AA3242	R.CHIP 750K 5% 1/10W
R8G5			40AA3243	R.CHIP 820K 5% 1/10W
R792			40AA3245	R.CHIP 1.0M 5% 1/10W
R5G1			40AA5141	R.CHIP 47H 5% 1/4W
R866	R993		40AA5193	R.CHIP 6.8K 5% 1/4W
R858			40AA5196	R.CHIP 9.1K 5% 1/4W
R898			40AA5207	R.CHIP 27K 5% 1/4W
R984			40AB1171	R.CHIP 820H 1% 1/8W
R506	R534		40AB1179	R.CHIP 1.8K 1% 1/8W
⚠R5U3			40AB1224	R.CHIP 130K 1% 1/8W
R865	R894		40AB2187	R.CHIP 3.9K 1% 1/4W
R724B	R724G	R724R	40AB3145	R.CHIP 68H 1% 1/10W
R624			40AB3149	R.CHIP 100H 1% 1/10W
R701B	R701G	R701R	40AB3153	R.CHIP 150H 1% 1/10W
R702B	R702G	R702R		
R703B	R703G	R703R		
R704B	R704G	R704R		
R101	R725B	R725G	40AB3155	R.CHIP 180H 1% 1/10W
R725R				
R535			40AB3163	R.CHIP 390H 1% 1/10W
R501	R723B	R723G	40AB3167	R.CHIP 560H 1% 1/10W
R723R				
R992			40AB3169	R.CHIP 680H 1% 1/10W
R104	R105		40AB3170	R.CHIP 750H 1% 1/10W

SYMBOL			PARTS NO	DESCRIPTION
R102	R103		40AB3173	R,CHIP 1.0K 1% 1/10W
R4H8	R508		40AB3174	R,CHIP 1.1K 1% 1/10W
R524			40AB3176	R,CHIP 1.3K 1% 1/10W
R50G	R527	R714	40AB3177	R,CHIP 1.5K 1% 1/10W
R50F			40AB3179	R,CHIP 1.8K 1% 1/10W
R4H7	R7A3		40AB3181	R,CHIP 2.2K 1% 1/10W
⚠R5U1	R518	R73F	40AB3183	R,CHIP 2.7K 1% 1/10W
R404			40AB3184	R,CHIP 3.0K 1% 1/10W
R59G	R722B	R722G	40AB3185	R,CHIP 3.3K 1% 1/10W
R722R				
R7A2			40AB3187	R,CHIP 3.9K 1% 1/10W
R526			40AB3189	R,CHIP 4.7K 1% 1/10W
R73E			40AB3191	R,CHIP 5.6K 1% 1/10W
R51A	R529	R967	40AB3193	R,CHIP 6.8K 1% 1/10W
R50H			40AB3196	R,CHIP 9.1K 1% 1/10W
R51C	R51F	R51T	40AB3197	R,CHIP 10K 1% 1/10W
R52C	R52E	R52F		
R52G	R52W	R59C		
R593	R86F	R867		
R957	R958	R959	40AB3198	R,CHIP 11K 1% 1/10W
R59M	R594	R713	40AB3199	R,CHIP 12K 1% 1/10W
R403	R51R	R517	40AB3200	R,CHIP 13K 1% 1/10W
R5X5			40AB3201	R,CHIP 15K 1% 1/10W
R522			40AB3202	R,CHIP 16K 1% 1/10W
R515	R591		40AB3203	R,CHIP 18K 1% 1/10W
R73G	R74AB	R74AG	40AB3205	R,CHIP 22K 1% 1/10W
R74AR				
R59E			40AB3207	R,CHIP 27K 1% 1/10W
R971	R972	R973	40AB3209	R,CHIP 33K 1% 1/10W
R974				
R74EB	R74EG	R74ER	40AB3211	R,CHIP 39K 1% 1/10W
R51E	R51G		40AB3212	R,CHIP 43K 1% 1/10W
R52A	R528	R963	40AB3213	R,CHIP 47K 1% 1/10W
R7AG			40AB3214	R,CHIP 51K 1% 1/10W
R525	R629	R630	40AB3217	R,CHIP 68K 1% 1/10W
⚠R5U2	R519	R749B	40AB3219	R,CHIP 82K 1% 1/10W
R749G	R749R			
R59A	R746B	R746G	40AB3221	R,CHIP 100K 1% 1/10W
R746R				
R74FB	R74FG	R74FR	40AB3222	R,CHIP 110K 1% 1/10W

SYMBOL			PARTS NO	DESCRIPTION
R6V9	R6W1		401KE689	R,CARBON 4.7K 5% 1/8W
R6V5			401KE693	R,CARBON 6.8K 5% 1/8W
R8K5			401KE695	R,CARBON 8.2K 5% 1/8W
R6V3			401KE697	R,CARBON 10K 5% 1/8W
R6P2			401KE713	R,CARBON 47K 5% 1/8W
R6V6	R6V8		401KE721	R,CARBON 100K 5% 1/8W
R741B	R741G	R741R	401KE737	R,CARBON 470K 5% 1/8W
R8K1			401KE741	R,CARBON 680K 5% 1/8W
R6V7			401KE745	R,CARBON 1.0M 5% 1/8W
R4J4	R4K9		401K5609	R,CARBON 2.2H 5% 1/8W
R8J4			401K5625	R,CARBON 10H 5% 1/8W
R8H4			401K5629	R,CARBON 15H 5% 1/8W
R4M2	R4M3		401K5649	R,CARBON 100H 5% 1/8W
R6W3			401K5663	R,CARBON 390H 5% 1/8W
R6K2	R6V4		401K5669	R,CARBON 680H 5% 1/8W
R4K6	R4M1	R6W0	401K5673	R,CARBON 1.0K 5% 1/8W
R676			401K5681	R,CARBON 2.2K 5% 1/8W
R6V9	R6W1		401K5689	R,CARBON 4.7K 5% 1/8W
R6V5			401K5693	R,CARBON 6.8K 5% 1/8W
R8K5			401K5695	R,CARBON 8.2K 5% 1/8W
R6V3			401K5697	R,CARBON 10K 5% 1/8W
R6P2			401K5713	R,CARBON 47K 5% 1/8W
R6V6	R6V8		401K5721	R,CARBON 100K 5% 1/8W
R741B	R741G	R741R	401K5737	R,CARBON 470K 5% 1/8W
R8K1			401K5741	R,CARBON 680K 5% 1/8W
R6V7			401K5745	R,CARBON 1.0M 5% 1/8W
⚠R636			40178143	R,CARBON 56H 5% 1/2W
⚠R5R1	⚠R5R2		40224137	R,WIRE 33H 5% 5W
⚠R602	⚠R606		40299104	R,WIRE 10H 5% 5W
R605			40299181	R,WIRE 56K 5% 5W
R622			40371103	R,METAL 1.2H 5% 1W
R7F5			40371109	R,METAL 2.2H 5% 1W
R8GE			40371113	R,METAL 3.3H 5% 1W
R561			40371125	R,METAL 10H 5% 1W
R583			40371129	R,METAL 15H 5% 1W
R584			40371131	R,METAL 18H 5% 1W
R559			40371133	R,METAL 22H 5% 1W
R8GG			40371147	R,METAL 82H 5% 1W
R5E3			40371187	R,METAL 3.9K 5% 1W

SYMBOL			PARTS NO	DESCRIPTION
R592			40AB3223	R,CHIP 120K 1% 1/10W
R5X4			40AB3226	R,CHIP 160K 1% 1/10W
R744B	R744G	R744R	40AB3227	R,CHIP 180K 1% 1/10W
R5A4			40AB3229	R,CHIP 220K 1% 1/10W
R599	R743B	R743G	40AB3233	R,CHIP 330K 1% 1/10W
R743R				
R523			40AB5223	R,CHIP 120K 1% 1/2W
R4J6	R4K3	R8H6	401CF609	R,CARBON 2.2H 5% 1/4W
R8J6				
R902B	R902G	R902R	401CF629	R,CARBON 15H 5% 1/4W
R6V1			401CF631	R,CARBON 18H 5% 1/4W
R9D3			401CF649	R,CARBON 100H 5% 1/4W
R6G2			401CF671	R,CARBON 820H 5% 1/4W
R9D5			401CF689	R,CARBON 4.7K 5% 1/4W
R631	R632		401CF731	R,CARBON 270K 5% 1/4W
R4J6	R4K3	R8H6	401C6609	R,CARBON 2.2H 5% 1/4W
R8J6				
R902B	R902G	R902R	401C6629	R,CARBON 15H 5% 1/4W
R6V1			401C6631	R,CARBON 18H 5% 1/4W
R9D3			401C6649	R,CARBON 100H 5% 1/4W
R6G2			401C6671	R,CARBON 820H 5% 1/4W
R9D5			401C6689	R,CARBON 4.7K 5% 1/4W
R631	R632		401C6731	R,CARBON 270K 5% 1/4W
⚠R6V2			401G6109	R,CARBON 2.2H 5% 1/4W
⚠R985	⚠R986		401G6141	R,CARBON 47H 5% 1/4W
⚠R5F2			401G6191	R,CARBON 5.6K 5% 1/4W
R4K4			401HE641	R,CARBON 47H 5% 1/2W
R4J5			401H5625	R,CARBON 10H 5% 1/2W
R4K4			401H5641	R,CARBON 47H 5% 1/2W
⚠R995			401H5677	R,CARBON 1.5K 5% 1/2W
R6P1			401H5727	R,CARBON 180K 5% 1/2W
⚠R6T1			401H5743	R,CARBON 820K 5% 1/2W
R4J4	R4K9		401KE609	R,CARBON 2.2H 5% 1/6W
R8J4			401KE625	R,CARBON 10H 5% 1/6W
R8H4			401KE629	R,CARBON 15H 5% 1/6W
R4M2	R4M3		401KE649	R,CARBON 100H 5% 1/6W
R6W3			401KE663	R,CARBON 390H 5% 1/6W
R6K2	R6V4		401KE669	R,CARBON 680H 5% 1/6W
R4K6	R4M1	R6W0	401KE673	R,CARBON 1.0K 5% 1/6W
R676			401KE681	R,CARBON 2.2K 5% 1/6W

SYMBOL			PARTS NO	DESCRIPTION
R677			40371199	R,METAL 12K 5% 1W
R86A	R869		40371205	R,METAL 22K 5% 1W
R863			40371207	R,METAL 27K 5% 1W
R5AE	R6A1	R6A2	40371221	R,METAL 100K 5% 1W
⚠R5R3			40371329	R,METAL 0.22H 5% 1W
R623			40371337	R,METAL 0.47H 5% 1W
⚠R5F1			40371339	R,METAL 0.56H 5% 1W
⚠R562			40372131	R,METAL 18H 5% 2W
R604			40372143	R,METAL 56H 5% 2W
R8J5			40372147	R,METAL 82H 5% 2W
R8H5			40372151	R,METAL 120H 5% 2W
R7E4			40372169	R,METAL 680H 5% 2W
R6E1			40372199	R,METAL 12K 5% 2W
R638			40372201	R,METAL 15K 5% 2W
R634			40372213	R,METAL 47K 5% 2W
R991			40372215	R,METAL 56K 5% 2W
R635			40372217	R,METAL 68K 5% 2W
R671			40373109	R,METAL 2.2H 5% 3W
R674			40373187	R,METAL 3.9K 5% 3W
⚠R571			40383028	R,METAL 180H 5% 3W
R55A			40399092	R,METAL 1.2H 5% 5W
R4M5			404CA679	R,METAL 1.8K 1% 1/6W
R626			404CA689	R,METAL 4.7K 1% 1/6W
R8K2			404CA697	R,METAL 10K 1% 1/6W
R4M4			404CA698	R,METAL 11K 1% 1/6W
R4J2	R4K2	R8H2	404CA704	R,METAL 20K 1% 1/6W
R8J2				
R4J1	R4K1	R8H1	404CA714	R,METAL 51K 1% 1/6W
R8J1				
R6W2			404CA715	R,METAL 56K 1% 1/6W
R8K4			404CA716	R,METAL 62K 1% 1/6W
⚠R5T2			404CA718	R,METAL 75K 1% 1/6W
⚠R5T1			404CA731	R,METAL 270K 1% 1/6W
R627	R628	R694	404CA745	R,METAL 1.0M 1% 1/6W
R695				
R8J3			404C1626	R,METAL 11H 1% 1/6W
R8H3			404C1631	R,METAL 18H 1% 1/6W
R4M5			404C1679	R,METAL 1.8K 1% 1/6W
R86G			404C1685	R,METAL 3.3K 1% 1/6W
R626			404C1689	R,METAL 4.7K 1% 1/6W

SYMBOL			PARTS NO	DESCRIPTION
R8K2			404C1697	R,METAL 10K 1% 1/6W
R4M4			404C1698	R,METAL 11K 1% 1/6W
R4J2	R4K2	R8H2	404C1704	R,METAL 20K 1% 1/6W
R8J2				
R4J1	R4K1	R8H1	404C1714	R,METAL 51K 1% 1/6W
R8J1				
R6W2			404C1715	R,METAL 56K 1% 1/6W
R8K4			404C1716	R,METAL 62K 1% 1/6W
R5T2			404C1718	R,METAL 75K 1% 1/6W
R5T1			404C1731	R,METAL 270K 1% 1/6W
R627	R628	R694	404C1745	R,METAL 1.0M 1% 1/6W
R695				
⚠R6K1			404E1329	R,METAL 0.22H 5% 1/4W
⚠R5A9			404J9509	R,METAL 470H 1% 1/4W
⚠R5E1	⚠R557		404J9510	R,METAL 2.2H 5% 1/4W
R4K5			404K2628	R,METAL 13H 1% 1/4W
R4J3			404K3623	C,METAL 8.2H 1% 1/2W
⚠R2001			404K5109	R,METAL 2.2H 5% 1/4W
⚠R86B			404K5117	R,METAL 4.7H 5% 1/4W
⚠R4M8			404K5123	R,METAL 8.2H 5% 1/4W
⚠R4H9	⚠R5A1	⚠R5X1	404K5125	R,METAL 10H 5% 1/4W
⚠R50J	⚠R51P	⚠R7E5		
⚠R994				
⚠R5P3			404K5149	R,METAL 100H 5% 1/4W
R406			40499440	R,METAL 1.0H 1% 1W
R983			40499449	R,METAL 10K 2% 1W
R625			40499462	R,METAL 0.12H 5% 3W
⚠R6G1			40499507	R,METAL 0.22H 5% 1/2W
⚠R6F1			40499508	R,METAL 0.1H 5% 1/2W
*** CAPACITORS ***				
C80A	C80E	C80F	42AA1509	C,CHIP CERAMIC 50V 1000PF
C79G			42AA1515	C,CHIP CERAMIC 50V 3300PF
C742B	C742G	C742R	42AA1521	C,CHIP CERAMIC 50V 0.01UF
C862				
C748			42AA1538	C,CERAMIC 25V 0.1UF
C607			42AA2721	C,CERAMIC 50V 0.1UF
C471	C523	C529	42AA2726	C,CERAMIC 50V 0.01UF
C702B	C702G	C702R		

SYMBOL			PARTS NO	DESCRIPTION
C5E3	C7AE	C954	42CA1440	C,CERAMIC 50V 100PF
C955				
C79A			42CA1444	C,CERAMIC 50V 150PF
C7A8	C7E2	C722B	42CA1448	C,CERAMIC 50V 220PF
C722G	C722R			
C598			42CA1452	C,CHIP 50V 330PF
C8G1			42CA1454	C,CERAMIC 50V 390UF
C625			42CA1456	C,CERAMIC 50V 470PF
C892			42CA1464	C,CERAMIC 50V 1000PF
C891			42CE0115	C,CERAMIC 100V 100PF
⚠C57C			420C9066	C,CERAMIC 500V 1800PF
C902			420C9551	C,CERAMIC 500V 100PF
C901			420C9557	C,CERAMIC 500V 330PF
C553	C985	C988	420C9563	C,CERAMIC 500V 1000PF
C593			420C9567	C,CERAMIC 500V 2200PF
C554			420C9571	C,CERAMIC 500V 4700PF
C904			420D0019	C,CERAMIC 2KV 1000PF
⚠C6T2	⚠C6T3		420EJ013	C,CERAMIC 400V 1000PF
C622			420J8065	C,CERAMIC 1K 1200PF 10%
C864			420J9118	C,CERAMIC 500V 0.01UF
C903			4204K108	C,CERAMIC 2KV 0.01UF
⚠C608			420G0330	C,CERAMIC 400V 2200PF
C8K1	C8K3		421A0425	C,CERAMIC 50V 0.01UF
C506			421C3335	C,CERAMIC 50V 470PF
C4M2	C6V2	C6V3	421C3479	C,CERAMIC 50V 0.1UF
C6V4				
C4J1	C4K1	C4K2	421D6009	C,CERAMIC 25V 0.1UF
C4K5	C4M3	C8H1		
C8H2	C8H5	C8J1		
C989			423E2111	C,CERAMIC 500V 10PF
C595	C794		427F4617	C,FILM 50V 0.022UF
C7E6			427F4620	C,FILM 50V 0.039UF
C5A5			427F4621	C,FILM 50V 0.047UF
C5A8	⚠C5T2	⚠C5U1	427F4625	C,FILM 50V 0.1UF
C795			427F4629	C,FILM 50V 0.22UF
C5A4			427F4643	C,FILM 50V 220PF 10%
C517	C52D		427F4651	C,FILM 50V 1000PF
C515			427F4654	C,FILM 50V 1800PF
C51H			427F4658	C,FILM 50V 3900PF
C744B	C744G	C744R	427F4673	C,FILM 50V 0.068UF

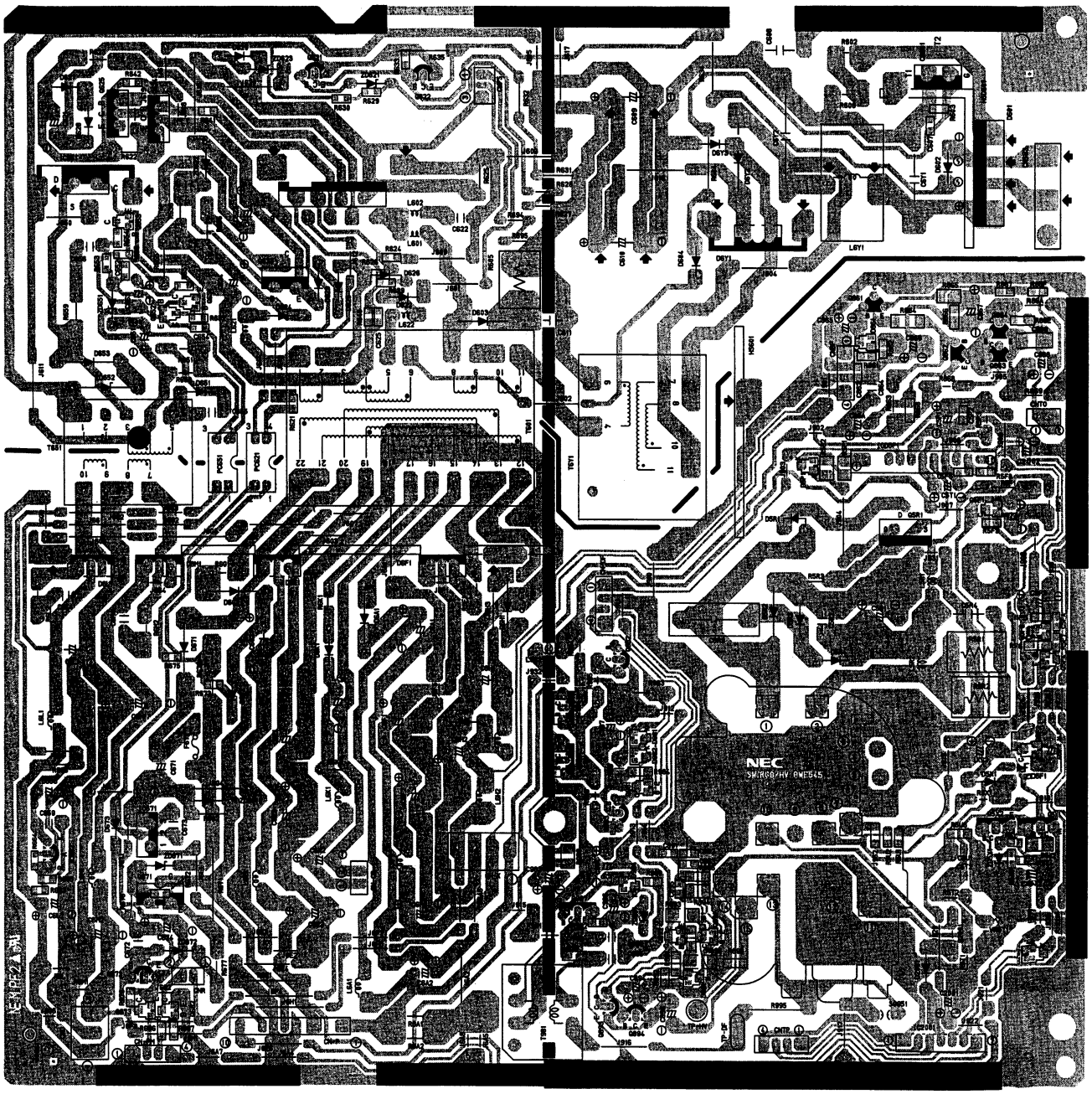
SYMBOL			PARTS NO	DESCRIPTION
C704B	C704G	C704R	42AA2726	C,CERAMIC 50V 0.01UF
C712B	C712G	C712R		
C8G5	C95F	C959		
C964				
C4H2	C402	C406	42AA2744	C,CERAMIC 25V 0.1UF
C482	C5A1	C5A2		
⚠C5F4	⚠C5F5	⚠C5P2		
C50C	C502	C505		
C509	C51A	C51C		
C51F	C513	C519		
C52A	C52C	C521		
C522	C524	C525		
C532	C533	C534		
C535	C537	C539		
C542	C543	C544		
C57E	C57F	C57H		
C57J	C57K	C57M		
C571	C59C	C59E		
C591	C7A1	C7A9		
C7F2	C7F3	C71AB		
C71AG	C71AR	C71E		
C714B	C714G	C714R		
C716	C718	C721B		
C721G	C721R	C724		
C725	C73E	C732B		
C732G	C732R	C733B		
C733G	C733R	C738		
C739	C751	C752		
C79K	C796	C798		
C8A1	C8G3	C8G7		
C8G8	C8G9	C801		
C803	C814	C893		
C905	C95C	C951		
C957	C961	C965		
C966				
C869			42AJ9026	C,CERAMIC 630V 0.1UF
C808	C809		42CA1416	C,CERAMIC 50V 10PF
C723B	C723G	C723R	42CA1426	C,CERAMIC 50V 27PF
C7E8			42CA1428	C,CERAMIC 50V 33PF
C791	C793		42CA1430	C,CERAMIC 50V 39PF
C72AB	C72AG	C72AR	42CA1434	C,CERAMIC 50V 56PF
C953			42CA1436	C,CERAMIC 50V 68PF
C79E			42CA1438	C,CERAMIC 50V 82PF

SYMBOL			PARTS NO	DESCRIPTION
C771			427F4675	C,FILM 50V 0.1UF
⚠C5R4			42703464	C,FILM 630V 0.012UF
C7A3			428B3511	C,METAL 50V 0.068UF
C705	C707		428B3513	C,METAL FILM 50V 0.1UF
C511			428B3619	C,METAL 50V 0.33UF
C727			428C9002	C,METAL FILM 100V 0.1UF
C7E1			428C9022	C,METAL FILM 250V 0.1UF
⚠C5R2			428DE025	C,METAL 100V 1.0UF
C5E2			428D0053	C,METAL 100V 0.1UF
C743B	C743G	C743R	428D0093	C,METALFILM 250V 0.1UF
C5A7	C7E4	C729B	428D0097	C,FILM 250V 0.22UF
C729G	C729R			
C611			428D0225	C,METAL 630V 0.022UF
C407			428D4317	C,METAL FILM 100V 0.22UF
C5G2	C5G4		428D5093	C,METAL 250V 0.1UF
C673			428D6009	C,METAL 100V 0.1UF
C672			428D6011	C,METAL 100V 0.15UF
⚠C575			42816350	C,FILM 250V 0.082UF 5%
⚠C57A			42816352	C,FILM 250V 0.12UF 5%
⚠C573			42816354	C,FILM 250V 0.18UF 5%
⚠C577			42816367	C,FILM 250V 1.5UF 5%
⚠C576	⚠C579		42816377	C,FILM 250V 0.13UF 5%
⚠C574			42816380	C,FILM 250V 0.30UF 5%
⚠C578			42816385	C,FILM 250V 0.75UF 5%
⚠C5R3			42826301	C,FILM 800V 1000PF
C6Y2			42839869	C,METAL FILM 400V 1.0UF
C6Y1			42845186	C,METAL FILM 400V 1.2UF
⚠C6T1	⚠C6T4		42898002	C,FILM AC250V 0.47UF
⚠C561			42899184	C,METAL 2.0KV 4700PF
⚠C5F3			430B6016	C,ELEC 10V 100UF
C581			430B6017	C,ELEC 10V 220UF
C512	C52F	C531	430B6028	C,ELEC 16V 47UF
C7F1	C73A	C731		
C772	C781	C79F		
C8G4				
C7AA	C735	C764	430B6029	C,ELEC 16V 100UF
C766	C797	C802		
C765			430B6030	C,ELEC 16V 220UF
C715			430B6031	C,ELEC 16V 330UF
C483	C501		430B6032	C,ELEC 16V 470UF

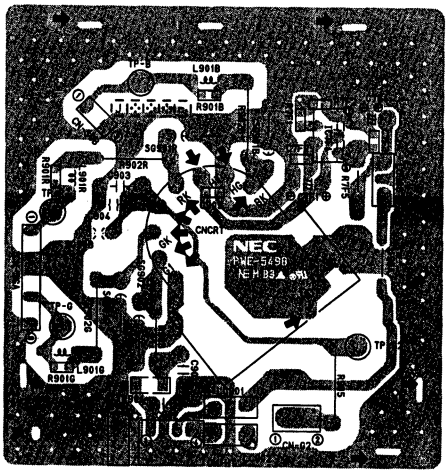
SYMBOL			PARTS NO	DESCRIPTION
C4K3	C4K4	C4M1	430B6041	C,ELEC 25V 47UF
C481	C53A	C536		
C538	C57T	C59F		
C597	C8H3	C8H4		
C8K2	C8K4	C952		
C956				
C4H1	C59H	C7E7	430B6042	C,ELEC 25V 100UF
C5AC	C5A9		430B6043	C,ELEC 25V 220UF
C963			430B6061	C,ELEC 50V 1.0UF
C504	C508		430B6062	C,ELEC 50V 2.2UF
C4H3	C4H7	C472	430B6064	C,ELEC 50V 4.7UF
C473	C516	C527		
C545	C7A2	C7A4		
C95E				
C503	C51L	C526	430B6065	C,ELEC 50V 10UF
C596	C7A5	C7E5		
C79H	C799	C865		
C866	C894	C95A		
C986				
C528			430B6067	C,ELEC 50V 33UF
C773			430B6068	C,ELEC 50V 47UF
C6P1			430B6082	C,ELEC 63V 10UF
C86A			430B6098	C,ELEC 100V 10UF
C728	C984		430B6101	C,ELEC 100V 47UF
C5X2			430B6514	C,ELEC 160V 3.3UF
C783			430B6552	C,ELEC 250V 1.0UF
C747			430B6556	C,ELEC 250V 10UF
C7E3	C709	C8A2	430B8144	C,ELEC 16V 47UF
C73F			430B8179	C,ELEC 50V 10UF
⚠C5F1			430B9016	C,ELEC 10V 100UF
C6K1			430B9020	C,ELEC 10V 1000UF
C71FB	C71FG	C71FR	430B9028	C,ELEC 16V 47UF
C713B	C713G	C713R		
C717				
C726			430B9030	C,ELEC 16V 220UF
⚠C5P1			430B9041	C,ELEC 25V 47UF
⚠C5T1			430B9064	C,ELEC 50V 4.7UF
C867			430B9065	C,ELEC 50V 10UF
⚠C2001			430B9066	C,ELEC 50V 22UF
C403			430B9070	C,ELEC 50V 220UF
C401	C405		430B9071	C,ELEC 50V 330UF

SYMBOL			PARTS NO	DESCRIPTION
C896			430B9094	C,ELEC 100V 1.0UF
C5E1			430B9096	C,ELEC 100V 3.3UF
C987			430B9098	C,ELEC 100V 10 UF
C983			430B9101	C,ELEC 100V 47UF
⚠C5X1	C624		430B9516	C,ELEC 160V 10UF
C741B	C741G	C741R	430B9552	C,ELEC 250V 1.0UF
C592	C868		430B9553	C,ELEC 250V 2.2UF
C8G6			430C6531	C,ELEC 16V 10UF
C50F			430C8522	C,ELEC 25V 330UF
C621			430C9502	C,ELEC 35V 220UF
C671			430C9503	C,ELEC 100V 47UF
C8K2			430E2027	C,ELEC 16V 100UF M
⚠C2002			430E2044	C,ELEC 25V 100UF M
C6F3	C6H2		430E2047	C,ELEC 25V 470UF M
C674			430E2102	C,ELEC 100V 1UF M
C6V1			430E3041	C,ELEC 25V 470UF M
C6E2			4302F102	C,ELEC 100V 100UF
C6A2			4302F557	C,ELEC 250V 22UF
C6F1	C6F2	C6G2	4302J047	C,ELEC 25V 2200UF
C6H1				
C6E1	C6E3		4302J104	C,ELEC 100V 330UF
C5A6			4302J556	C,ELEC 250V 10UF
C5G3			4302J558	C,ELEC 250V 33UF
C623			43029071	C,ELEC 50V 330UF
C552			4303H527	C,ELEC 25V 2200UF
C6A1			4303J149	C,ELEC 250V 220UF
⚠C5R1			4309J196	C,ELEC 100V 120UF
C5G1			4309J236	C,ELEC 350V 33UF
C609	C610		43113178	C,ELEC 400V 330UF M
⚠C5F2			433A4013	C,ELEC 10V 47UF
C582			433A4026	C,ELEC 16V 100UF
C958			433A4033	C,ELEC 25V 10UF
C7AG			433A4056	C,ELEC 50V 2.2UF
C711B	C711G	C711R	433A4057	C,ELEC 50V 3.3UF
C706	C708		433A6143	C,ELEC 16V 10UF
C52E			433A6147	C,ELEC 16V 47UF
C701B	C701G	C701R	433A6148	C,ELEC 16V 100UF
C703B	C703G	C703R		
⚠C562			433A7014	C,ELEC 16V 100UF
C5A3			433A7046	C,ELEC 50V 10UF

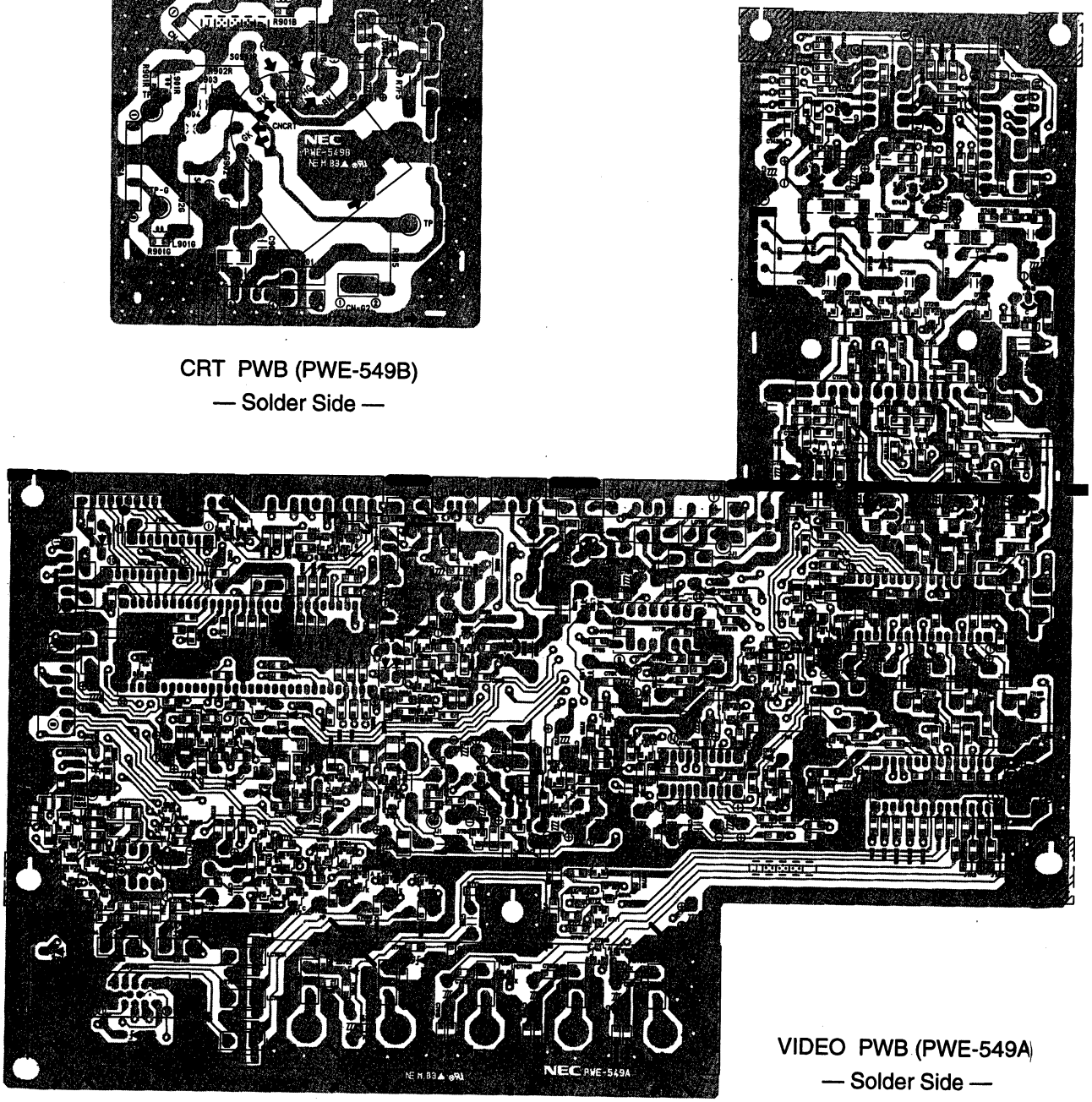
PRINTED WIRING BOARDS



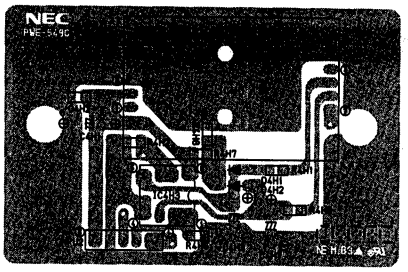
SW,REG/HV PWB (PWE-545)
— Solder Side —



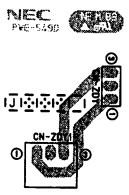
CRT PWB (PWE-549B)
— Solder Side —



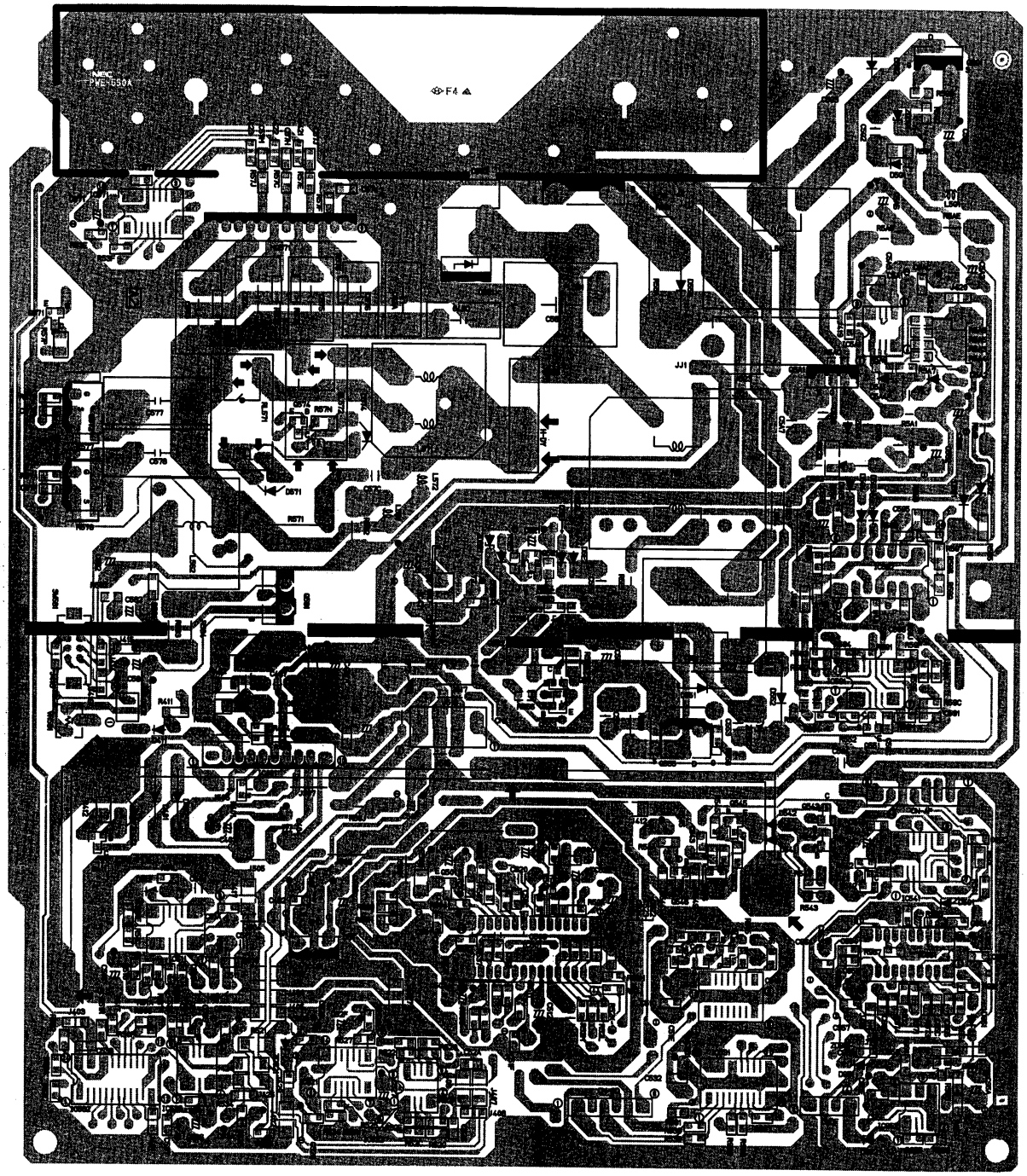
VIDEO PWB (PWE-549A)
— Solder Side —



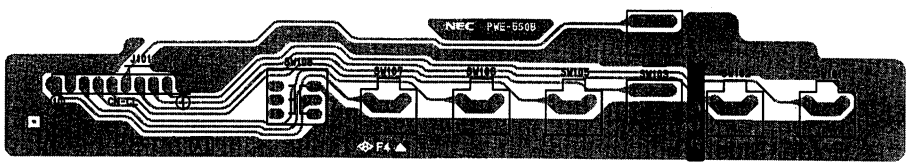
PU PWB (PWE-549C)
— Solder Side —



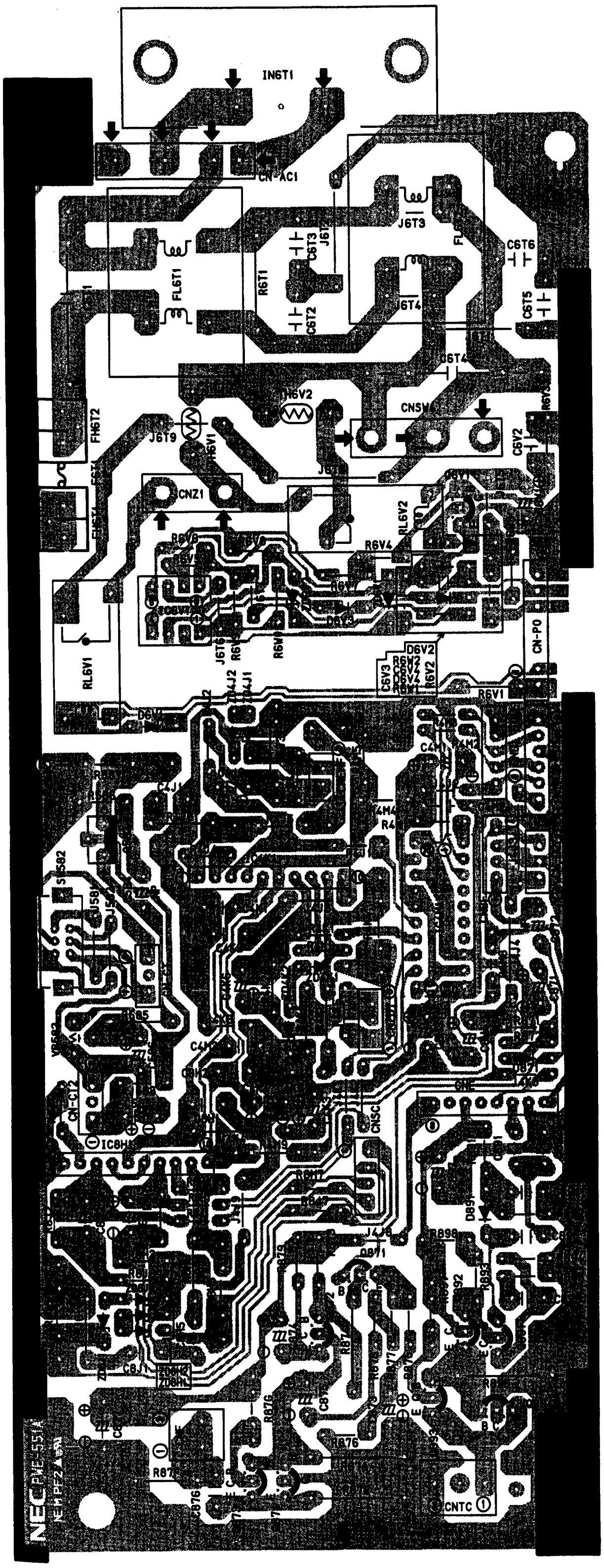
Z COIL PWB (PWE-549D)
— Solder Side —



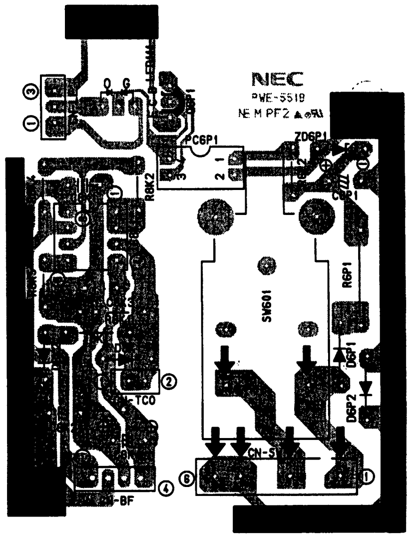
DEF PWB (PWE-550A)
— Solder Side —



CONT PWB (PWE-550B)
— Solder Side —

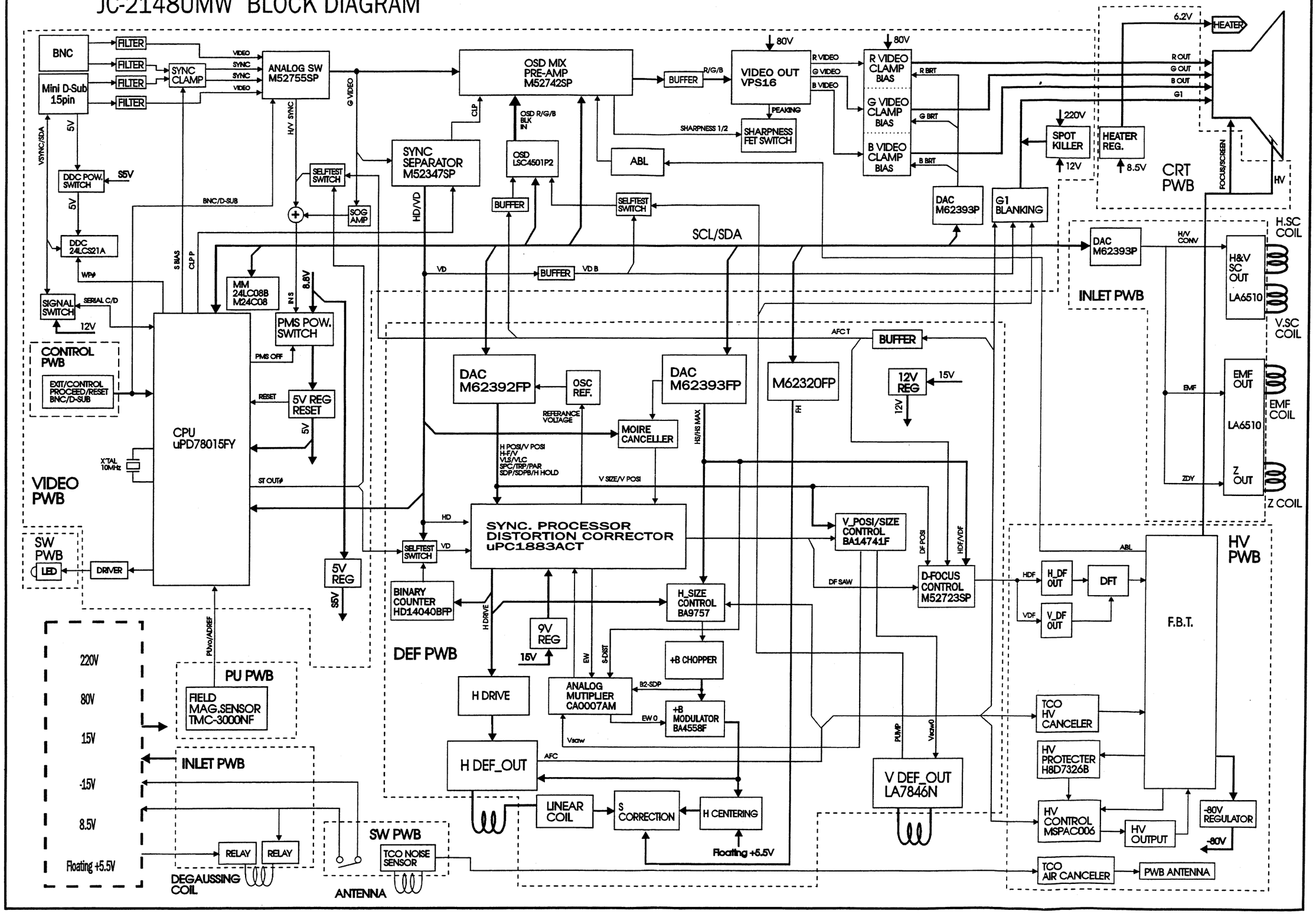


INLET PWB (PWE-551A)
— Solder Side —



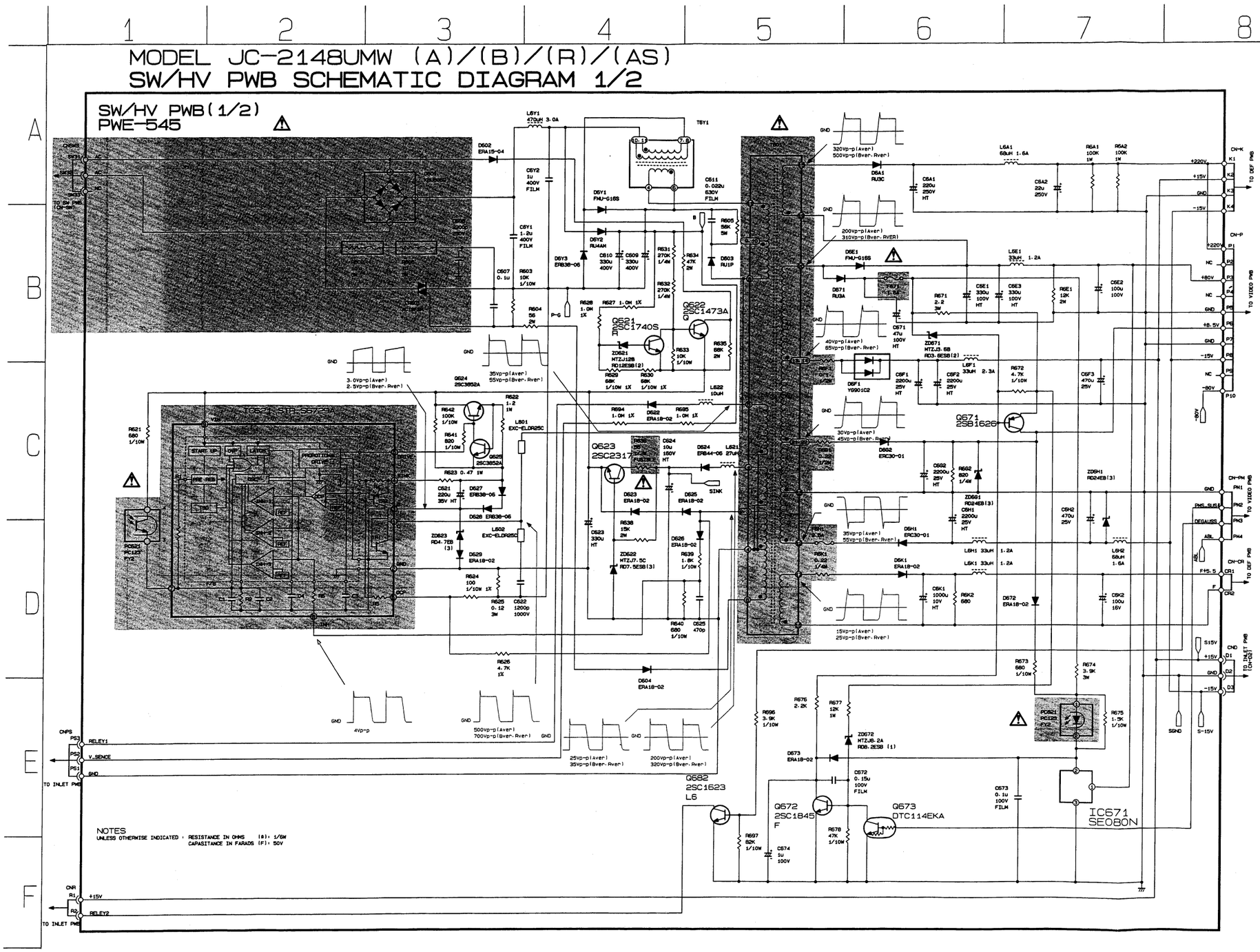
SW PWB (PWE-551B)
— Solder Side —

JC-2148UMW BLOCK DIAGRAM



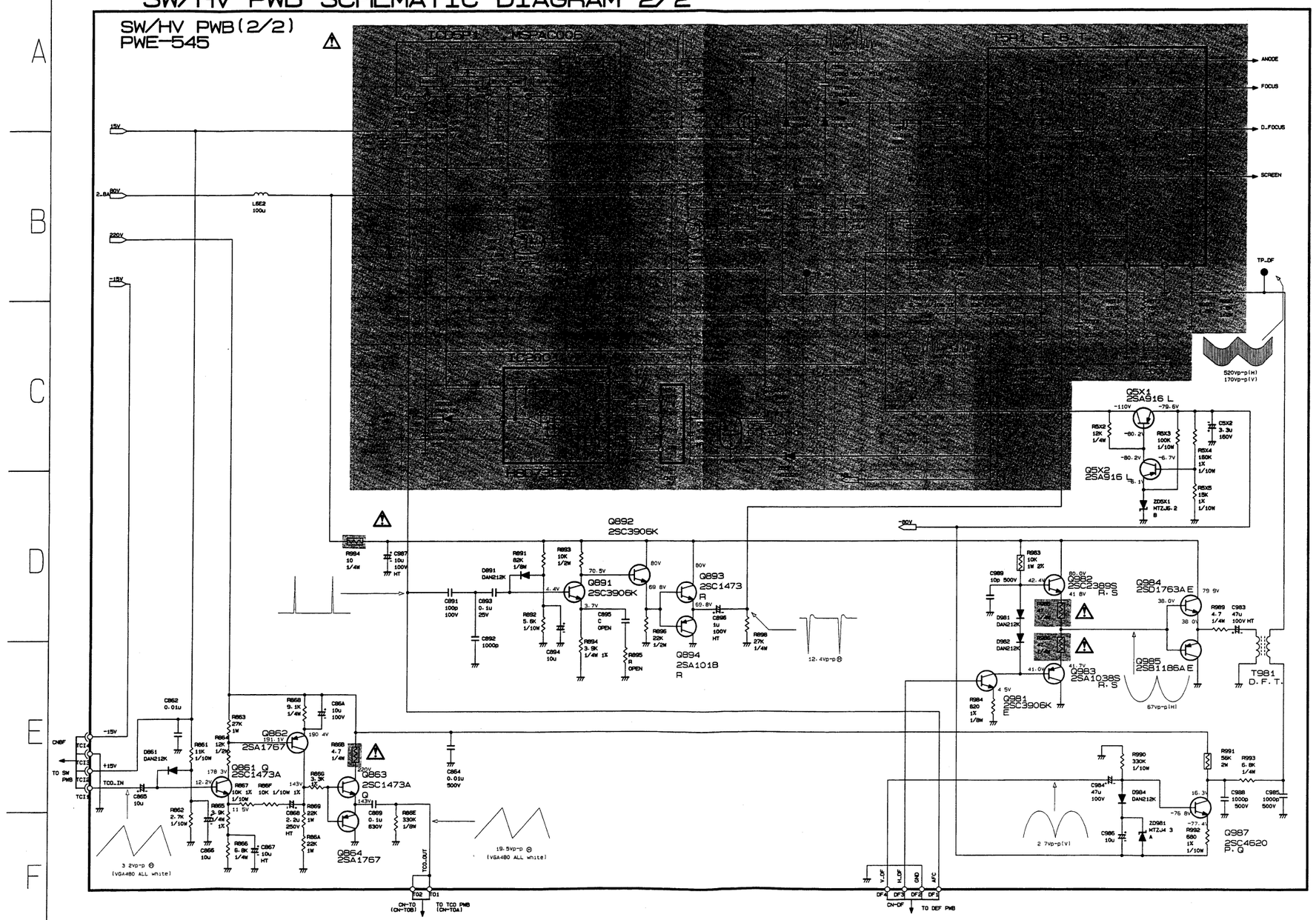
MEMO

MODEL JC-2148UMW (A)/(B)/(R)/(AS)
SW/HV PWB SCHEMATIC DIAGRAM 1/2



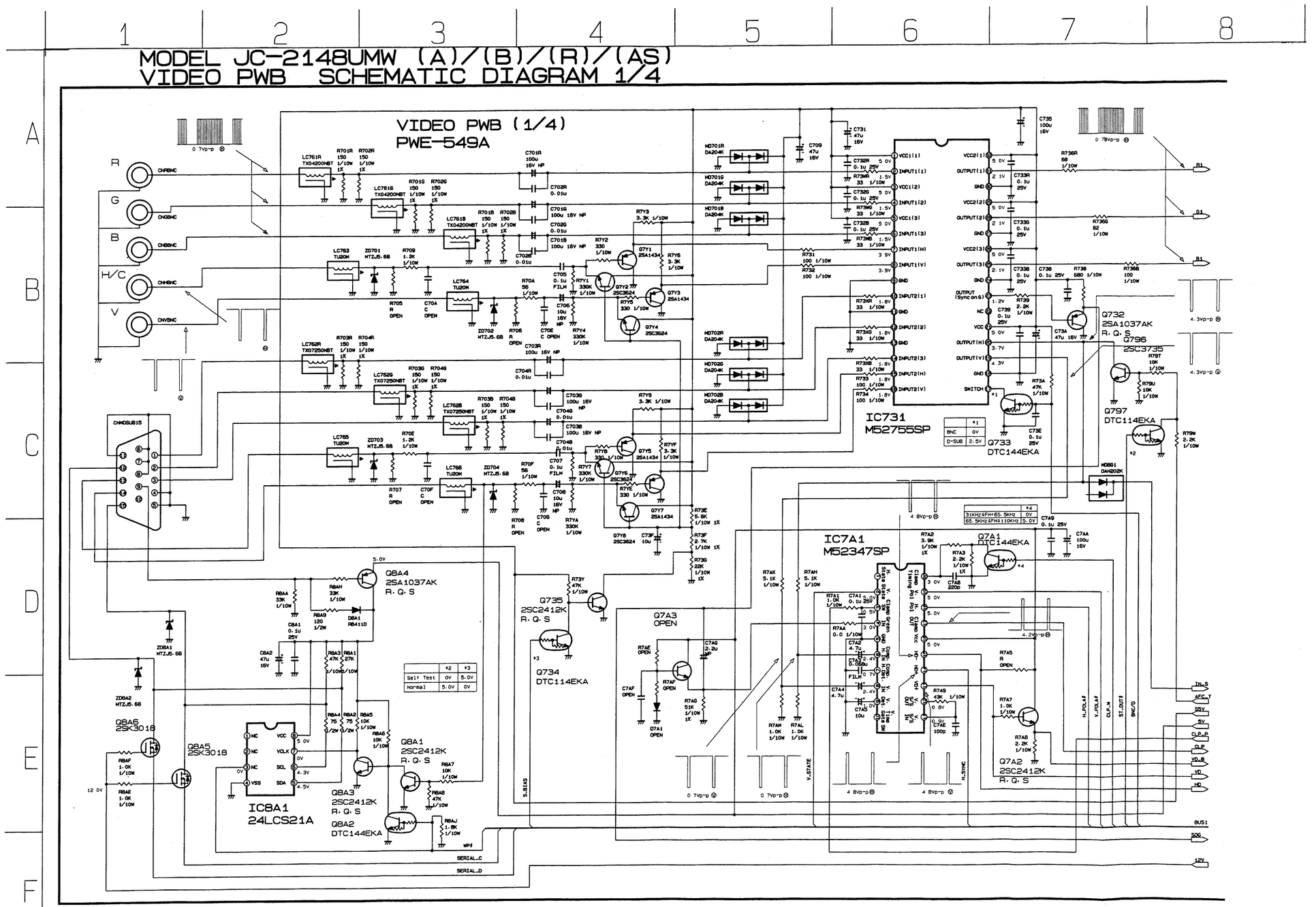
08109172-E
~08109175-E

MODEL JC-2148UMW (A)/(B)/(R)/(AS)
SW/HV PWB SCHEMATIC DIAGRAM 2/2



08109172-E
~08109175-E

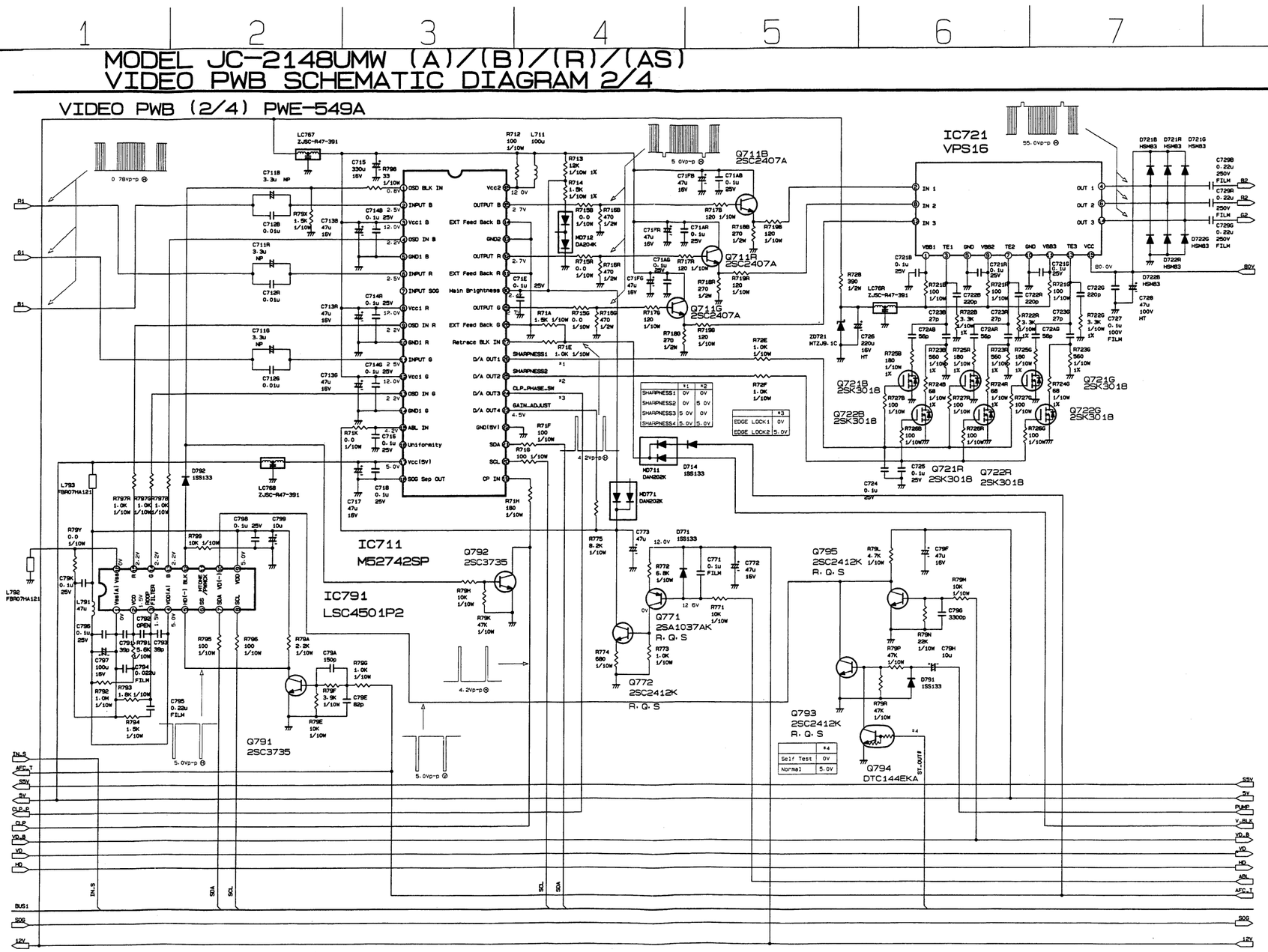
MODEL JC-2148UMW (A)/(B)/(R)/(AS)
VIDEO PWB SCHEMATIC DIAGRAM 1/4



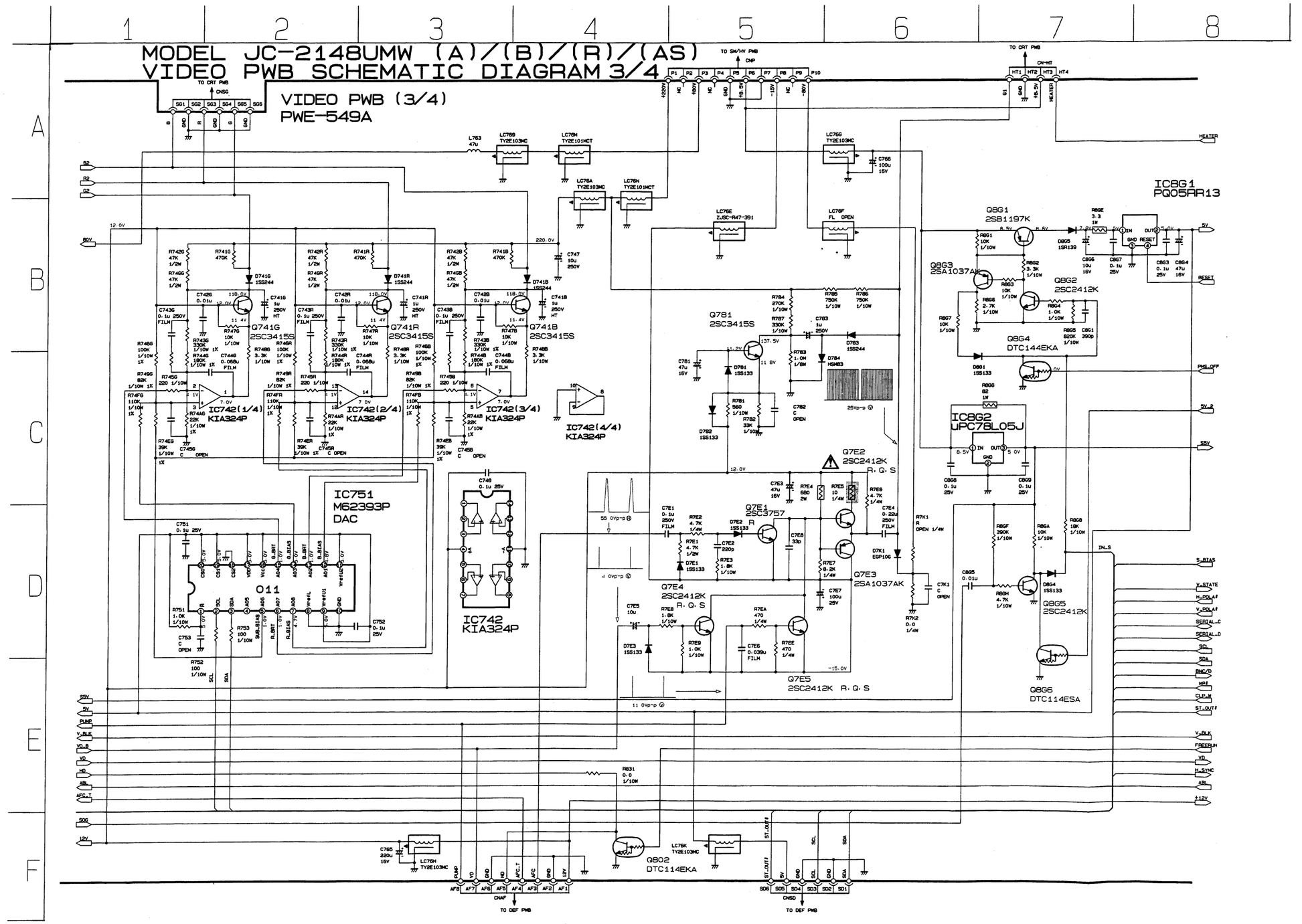
08109172-E
~08109175-E

MODEL JC-2148UMW (A)/(B)/(R)/(AS)
VIDEO PWB SCHEMATIC DIAGRAM 2/4

VIDEO PWB (2/4) PWE-549A

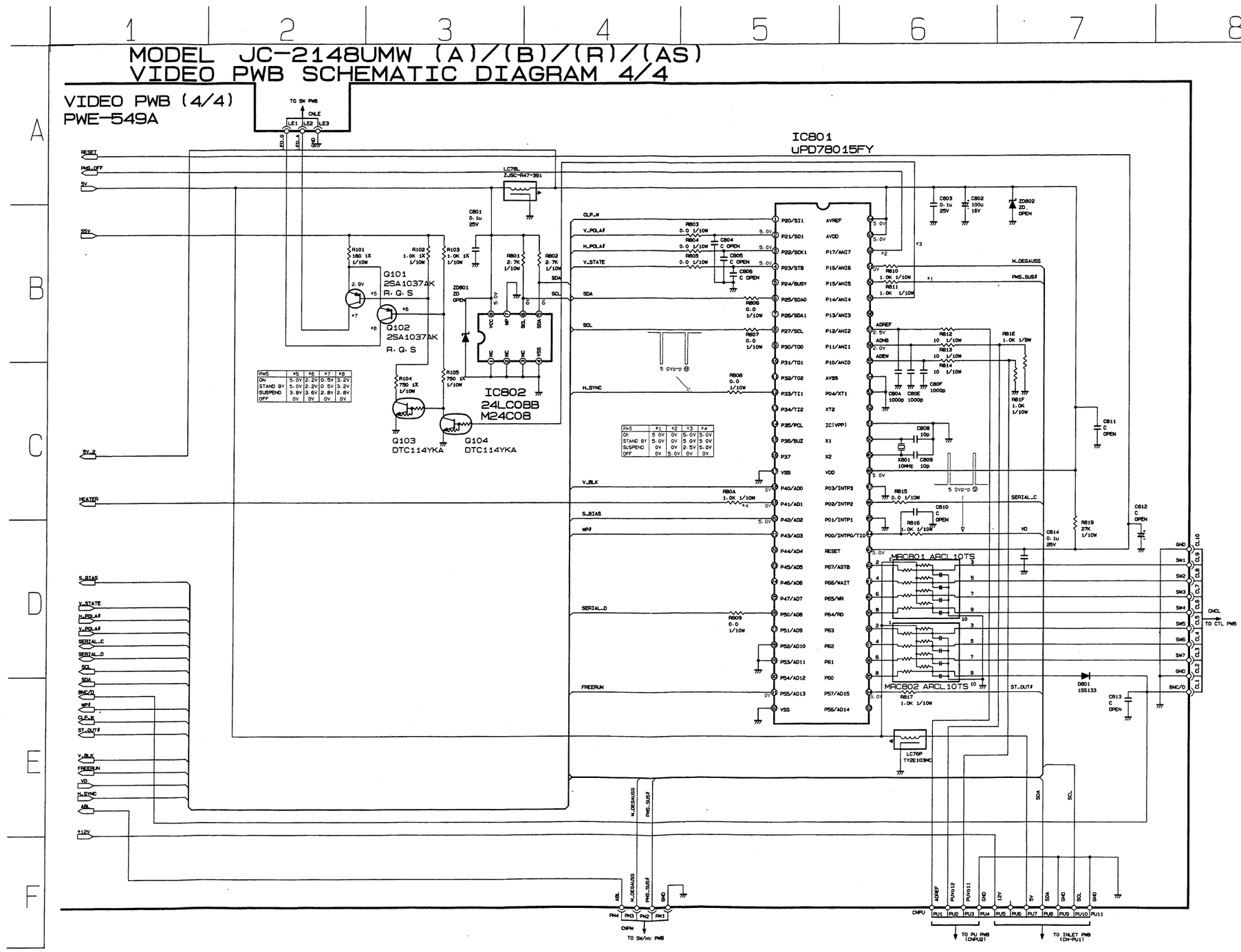


MODEL JC-2148UMW (A)/(B)/(R)/(AS)
VIDEO PWB SCHEMATIC DIAGRAM 3/4



08109172-E
~08109175-E

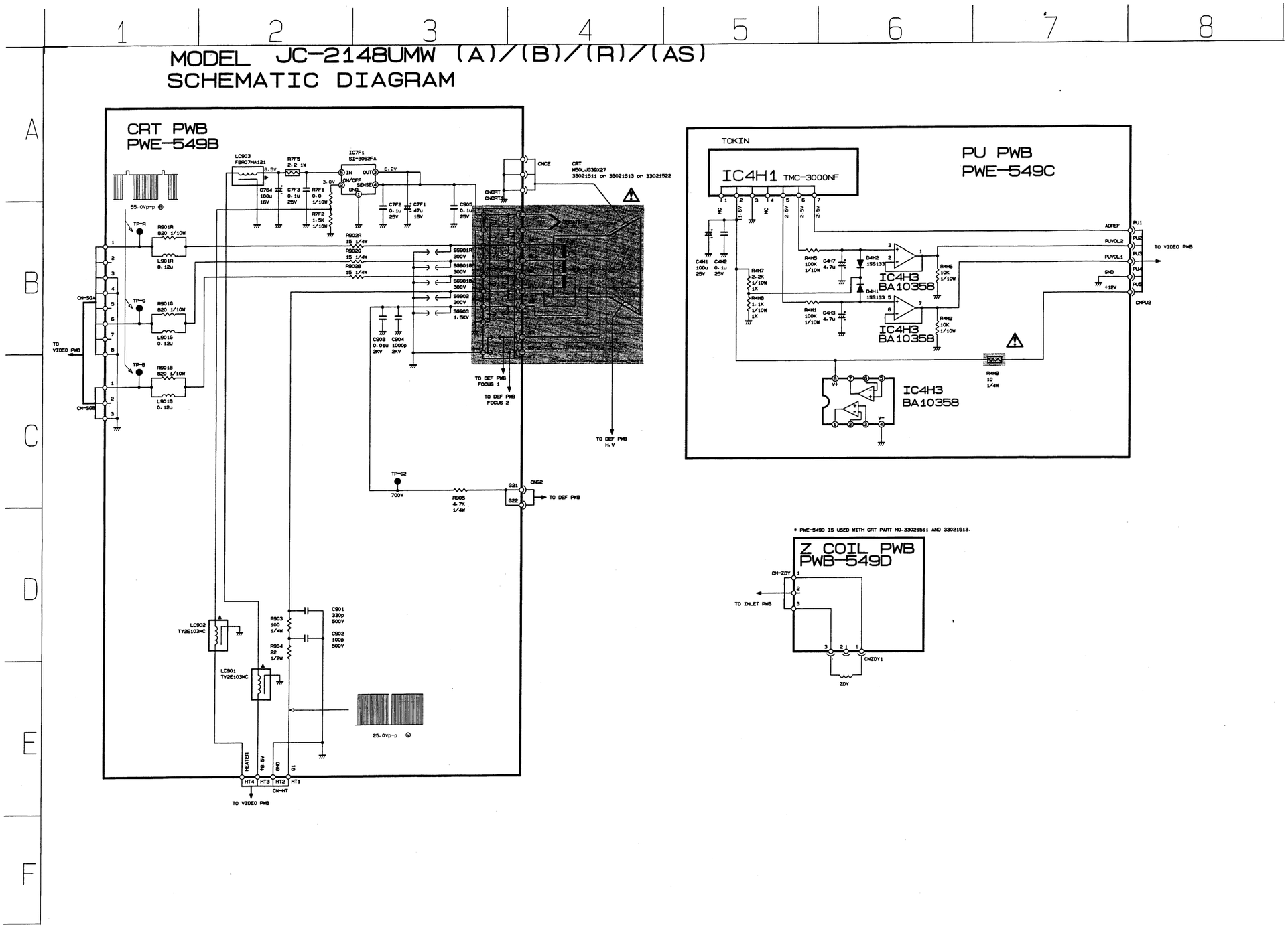
MODEL JC-2148UMW (A)/(B)/(R)/(AS)
VIDEO PWB SCHEMATIC DIAGRAM 4/4



PWS	#5	#6	#7	#8
ON	5.0V	2.2V	0.5V	3.2V
STAND BY	5.0V	2.2V	0.5V	3.2V
SUSPEND	3.8V	3.6V	2.8V	2.8V
OFF	0V	0V	0V	0V

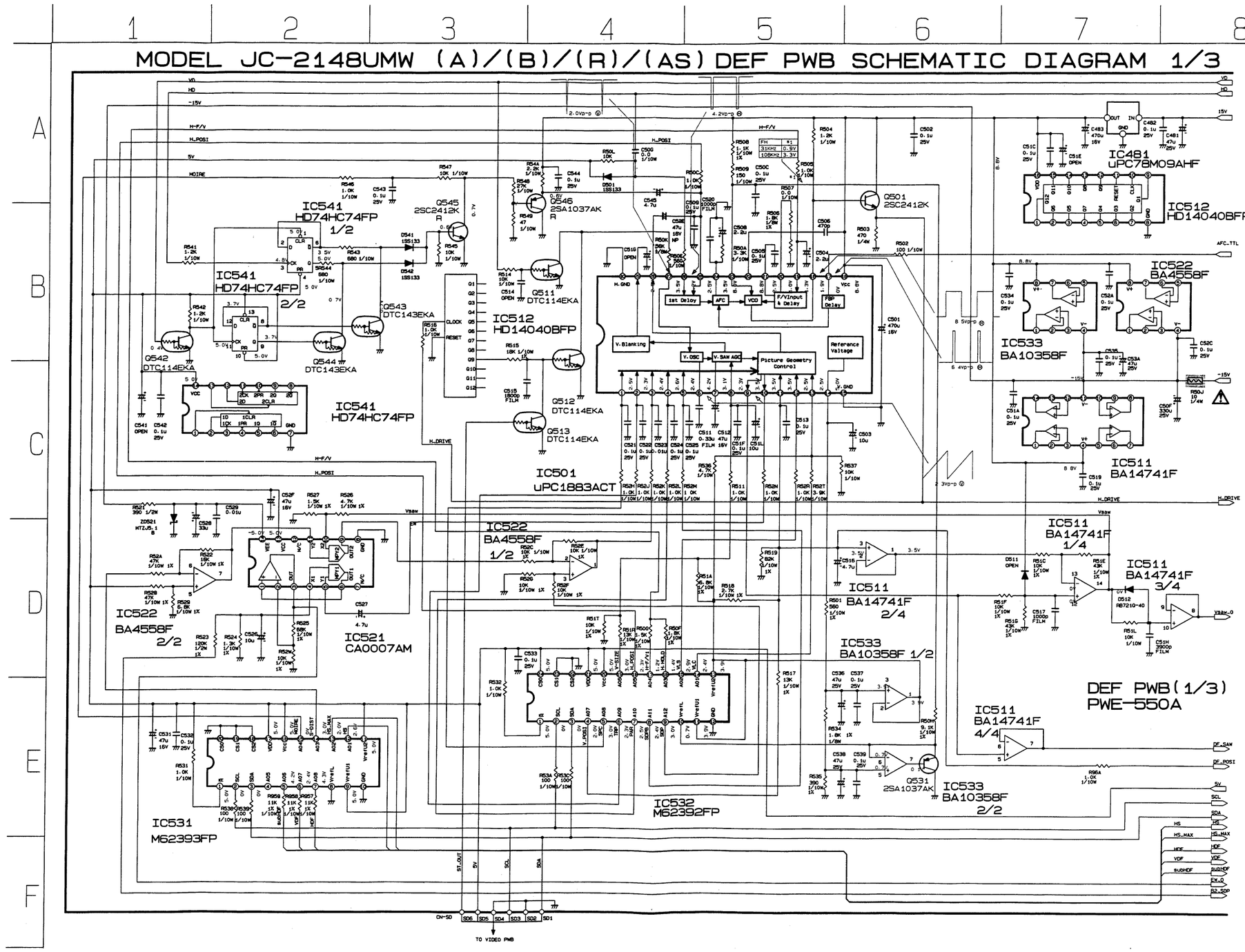
P-S	#1	#2	#3	#4
ON	5.0V	0V	5.0V	5.0V
STAND BY	5.0V	0V	5.0V	5.0V
SUSPEND	0V	0V	2.5V	5.0V
OFF	0V	5.0V	0V	0V

MODEL JC-2148UMW (A)/(B)/(R)/(AS)
SCHEMATIC DIAGRAM

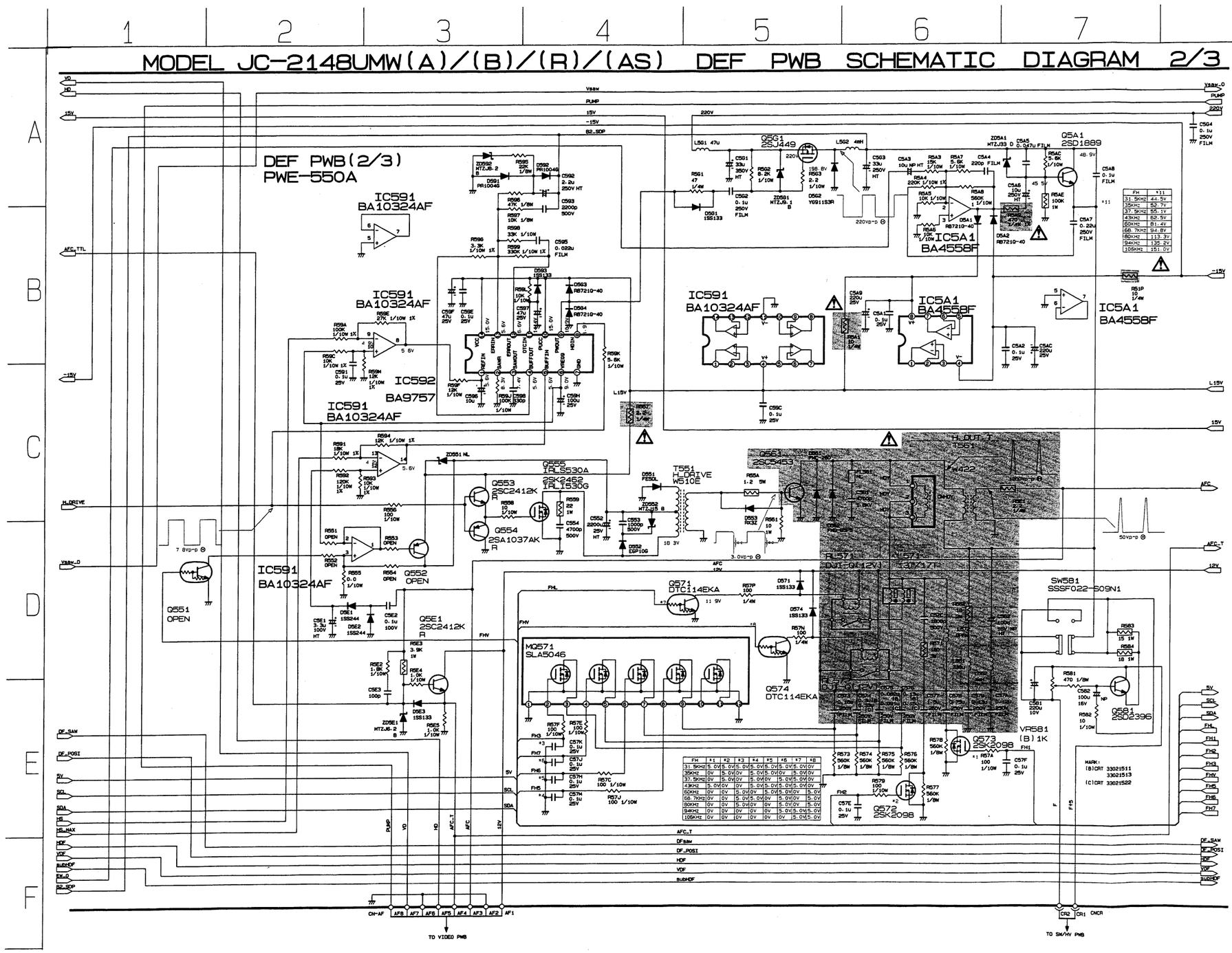


08109172-E
~08109175-E

MODEL JC-2148UMW (A)/(B)/(R)/(AS) DEF PWB SCHEMATIC DIAGRAM 1/3



MODEL JC-2148UMW(A)/(B)/(R)/(AS) DEF PWB SCHEMATIC DIAGRAM 2/3



08109172-E
~08109175-E

MODEL JC-2148UMW (A)/(B)/(R)/(AS) DEF PWB SCHEMATIC DIAGRAM 3/3

DEF PWB(3/3)
PWE-550A

IC401 LA7846N

IC571
M62320FP

IC951
M52723SP
-701

IC471
uPC78M12AHF

IC952
BA10358F

IC952
BA10358F

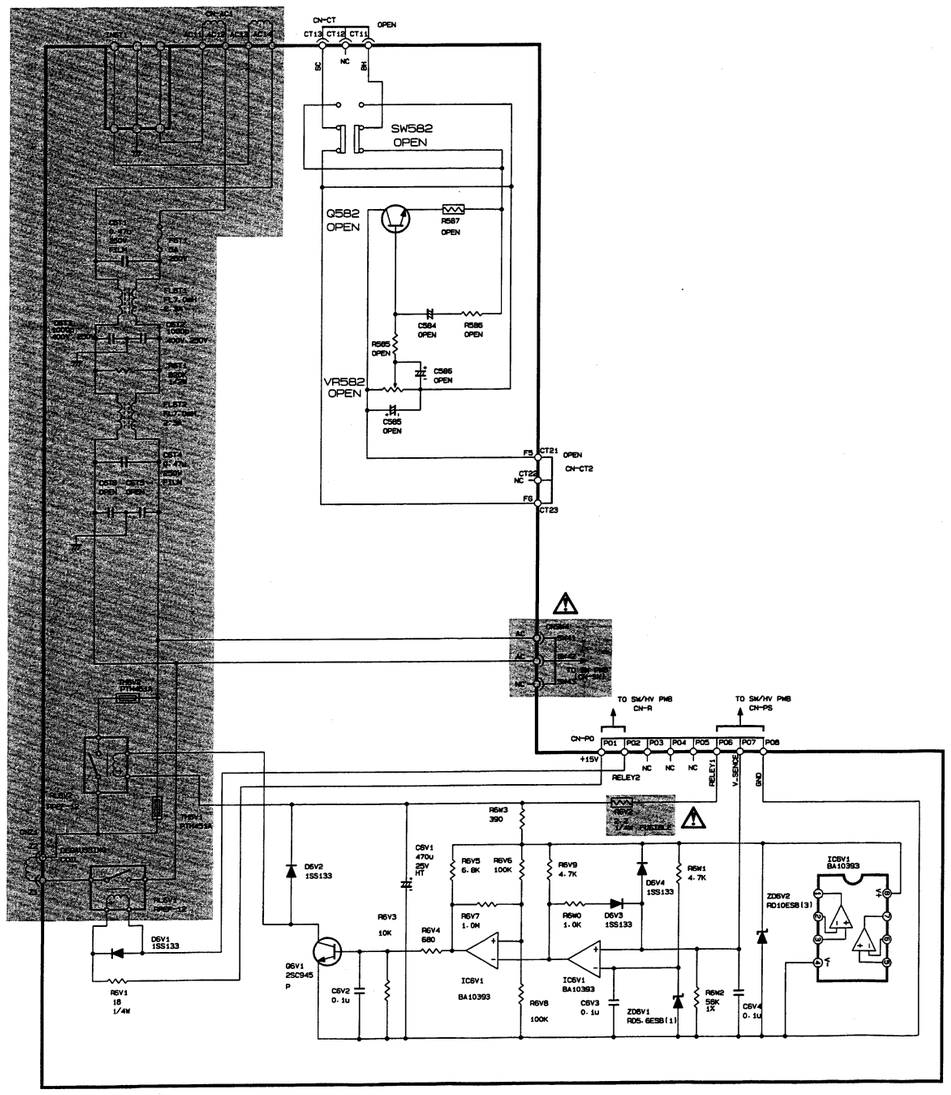
IC952
BA10358F

TO SW.REG/HV PWB

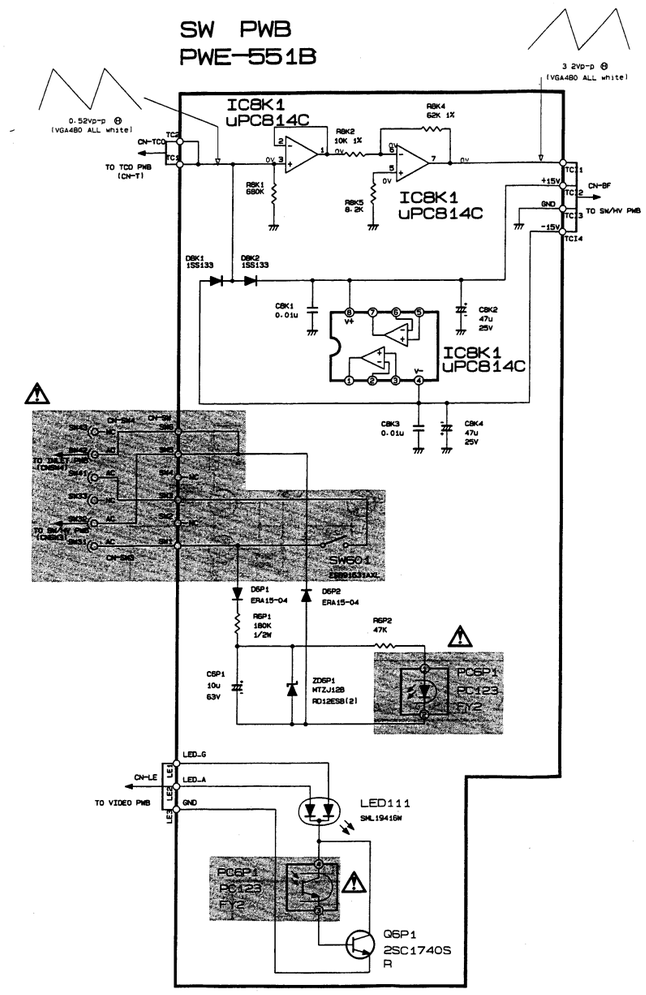
TO SW.REG/HV PWB

MODEL JC-2148UMW (A)/(B)/(R)/(AS) SCHEMATIC DIAGRAM

INLET PWB (1/2)
PWE-551A



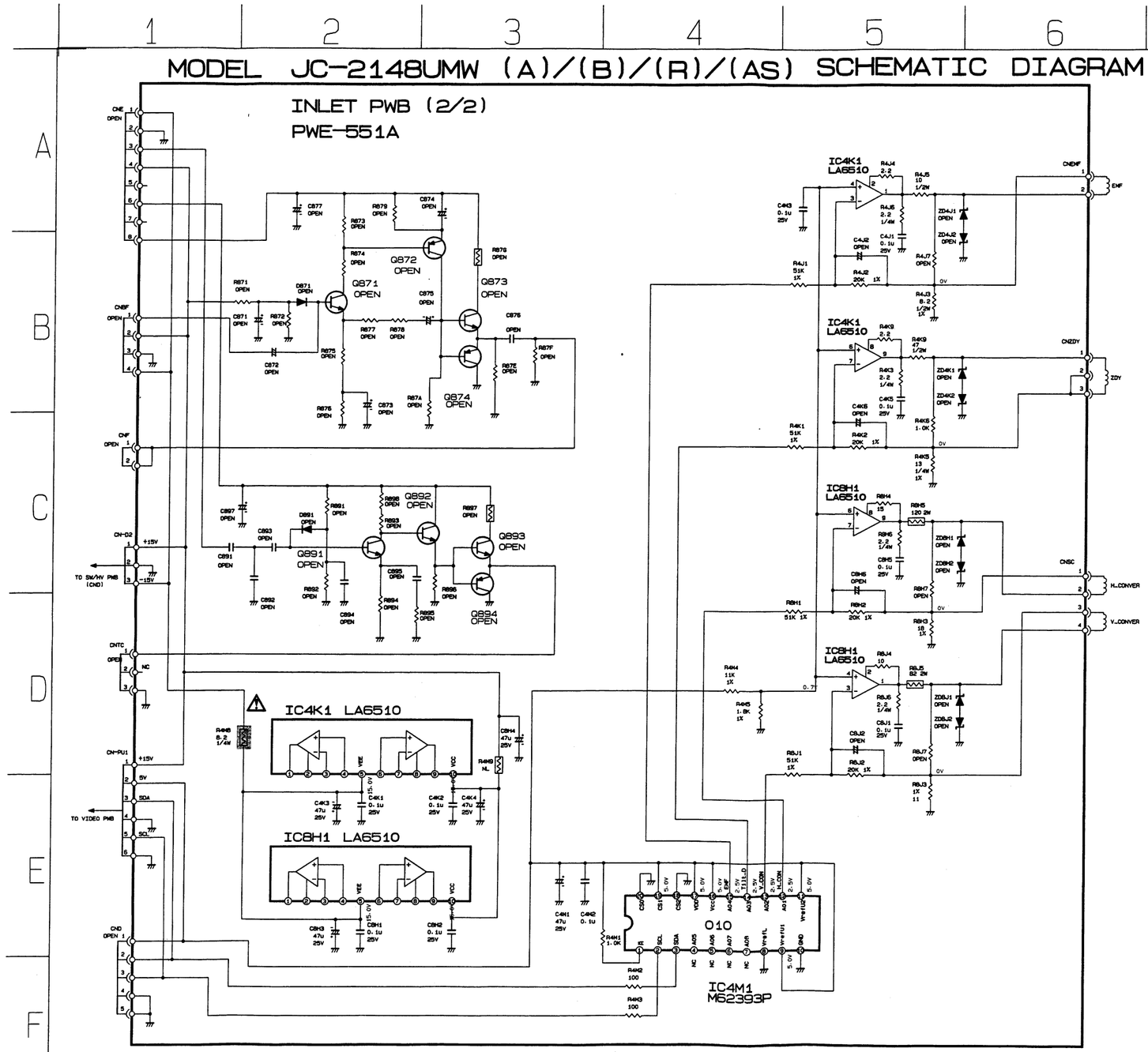
SW PWB
PWE-551B



08109172-E
~08109175-E

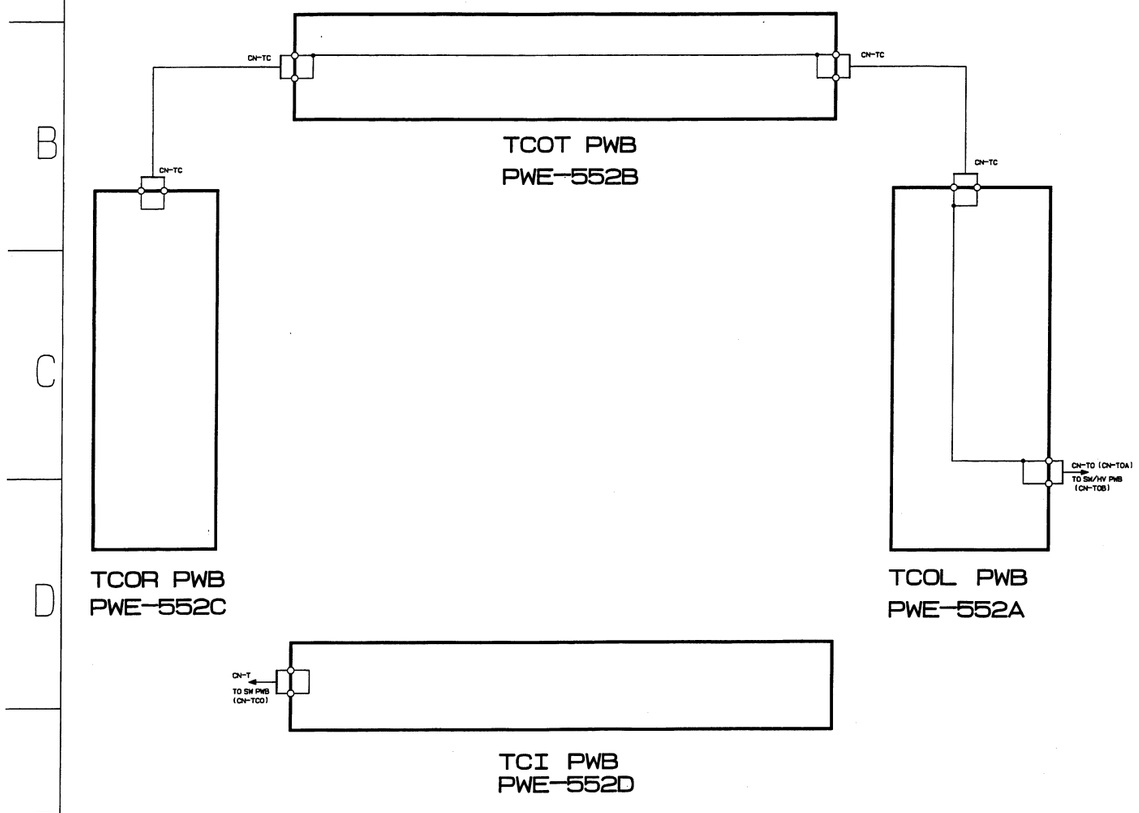
MODEL JC-2148UMW (A)/(B)/(R)/(AS) SCHEMATIC DIAGRAM

INLET PWB (2/2)
PWE-551A

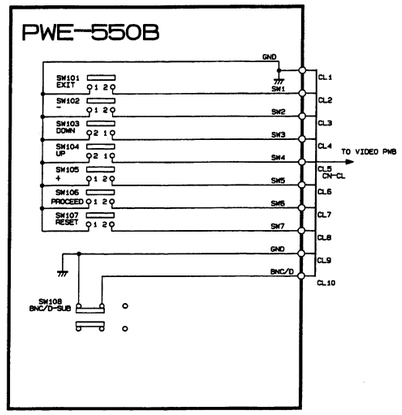


MODEL JC-2148UMW (A)/(B)/(R)/(AS) SCHEMATIC DIAGRAM

TCO PWB SCHEMATIC DIAGRAM



CONTROL PWB SCHEMATIC DIAGRAM



NOTES

1. RESISTOR VALUES ARE IN Ω(OHM). K=1.000Ω M=1.000.000Ω
2. ALL RESISTORS ARE 1/6W EXCEPT WHERE OTHERWISE INDECATED.
3. CAPACITOR VALUES ARE IN F(FARAD). u=uF(10^(-6)F) p=pF(10^(-12)F
4. ALL CAPACITORS ARE 50VOLTS EXCEPT WHERE OTHERWISE INDECATED.
5. VOLTAGES AND WAVEFORMS ARE MEASURED UNDER THE "H" CHARACTER SIGNALS EXCEPT INDIVIDUALLY DISCRIPTION
   IN THE CONDITIONS OF THE CONTRAST CONTROL IS MAXIMUM. THE BRIGHTNESS CONTROL IS MINIMUM. COLOR CONTROL R/G/B IS MAXIMUM AND ALL OTHER CONTROLS ARE NORMAL OPERATION
   CONDITION OF HORIZONTAL MAGNETIC FIELD IS 0(uT)
6. Ⓗ : HORIZONTAL RATE Ⓥ : VERTICAL RATE
7. VOLTAGES AND WAVEFORMS ARE MEASURED UNDER THE FOLLOWING SYNC AND VIDEO EXCEPT WHERE OTHERWISE INDICATED.
   SYNC : HORIZONTAL RATE 31.5KHz TTL LEVEL NEGATIVE.
   VERTICAL RATE 60Hz TTL LEVEL NEGATIVE.
   VIDEO : ANALOG 0.7Vp-p POSITIVE

WARNING

REPLACEMENT PARTS WHICH HAVE SPECIAL SAFETY CHARACTERISTICS ARE IDENTIFIED BY ⚠ SHADING ON THE SCHMATICS. REPLACE THESE CRITICAL COMPONENTS WITH RECOMMENDED REPLACEMENT PARTS.
DON'T DEGRADE THE SAFETY OF THE SET THROUGH IMPROPER SERVICING.
CONTROLS MARKED * IS PERMANENTLY FROZEN.
DO NOT ATTEMPT TO DEFEAT OR IMPROPERLY REPLACE

MEMO